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Emery-Wheel Tool Grinders.

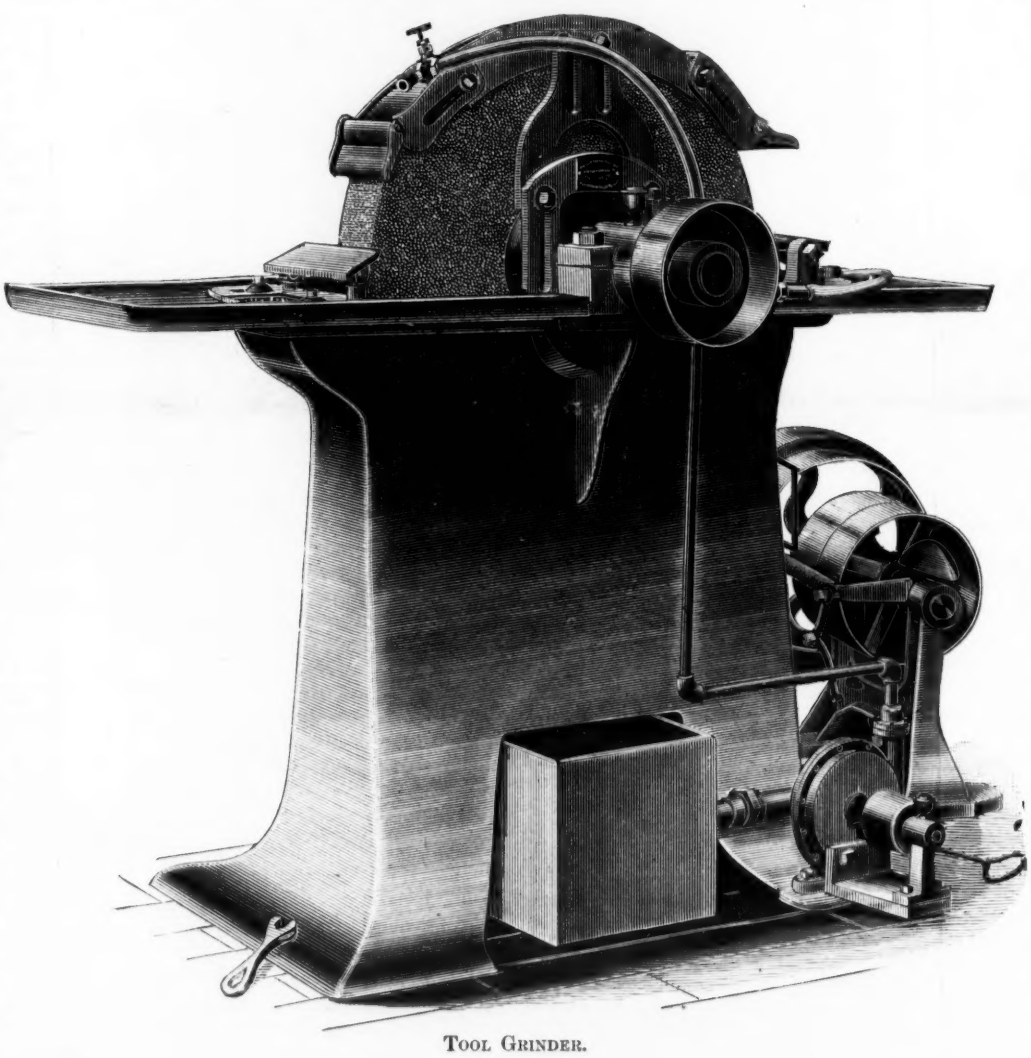
The engravings on pages 1 and 2 illustrate two grinders, manufactured by Springfield Glue & Emery Wheel Co., of Springfield, Mass. Patented Sept. 25th, 1883. One is for grinding on the front side of the wheel, the other on both front and back sides, giving the claimants of front and back grinding a selection.

This grinder is used for sharpening machinists' tools; the claim made for it being that it has many advantages over an ordinary grindstone. It occupies less space, the men stand near the wheel and so do better work. The grade or coarseness of grit and degree of hardness can be regulated and adapted to the kind of work to be done. The particles of stone composing the wheel are sharp-cut, and being five or six times harder than those of the ordinary grindstone, do so much more work. Thus a grindstone 3 feet in diameter, making 70 revolutions, gives 660 feet per minute of grinding surface, while an emery wheel 2 feet in diameter can safely make 550 revolutions, and so give 3,460 feet, or over five times the grinding surface per minute of harder, sharper and better cutting grit.

Thus a machinist averages half an hour daily at a grindstone; so in a shop with 20 men, ten hours per day are consumed sharpening tools, which, at 20 cents an hour, costs $600 a year.

A good emery-wheel tool grinder will do the same work in less than half the time at a saving of over $300 a year—more than enough to pay for the machine the first year, even if the grindstone costs nothing.

The emery wheel in this machine is surrounded by a hood, except where the grinding is done, which prevents the water flying off, even at the high speed, and is adjustable to the wheel as it wears away. The front section is provided with a pocket with holes through it, to distribute the water over the face of the wheel as it leaves the pipe. This pocket being open is easily cleaned of any dirt or rust that accumulates in the holes.



TOOL GRINDER.

An iron tank is placed under the wheel to receive the water coming from it, and catch the waste ground off; the latter settles to the bottom out of the way, and can be readily cleaned out from time to time. Having this easy way of access is a very important feature. A centrifugal pump is connected with this water tank by a pipe taking the water midway between top and bottom of tank above the settlings, so the water is always comparatively clean; there is plenty of it, and the flow on the wheel is controlled by a valve to the desired amount.

Four sizes of this general design are manufactured, each using steel spindles from 2¾ to 1½-inch diameter, with frame proportioned to the size of emery wheel used, as follows:

30x4 inches, 26x4 inches, 20x3 inches and 14x2½ inches.

The small engraving on page 2 represents a slide-rest and diamond tool made by this company for truing-up emery wheels. It is shown so clearly as to require no description.

Electricity on the Elevated Railroads.

The Daft electric motor has at this writing been for some weeks in position on the Ninth Avenue Elevated Railroad in this city; but so far beyond demonstrating its ability to move backwards and forwards over the rails, nothing seems to be doing with it. Engineers acquainted with the service on the elevated roads do not believe the motor can handle the trains, and the long delay in starting work with it further prejudices them against it. Attempts of this kind, which certainly look more like efforts to push the sale of stock than to solve the problem of electric propulsion on the elevated roads are doing a good deal towards confirming a belief that there has been more of wind than of electricity in the whole matter.

Those who are managing these electric motors should understand that the people are not entirely ignorant of the possibilities of electricity, and have ceased to be interested in playthings. Climbing forty-five-degree inclines may be all well enough to talk about for a little while, but it soon loses its interest. No one, so far as we know, is looking for a motor to climb such grades. If this motor was made simply to show that it would move along on the track, it is a success, so far as accomplishing this end goes, but it is a failure so far as convincing people of ordinary intelligence is concerned, that it has any practical value. If it was made to move trains on schedule time over the road it is a failure, or else has not so far been judiciously handled. We shall be glad to hear of a trial in actual service that will first settle its ability to do the work, and then the economy with which it can do it. We are told by those who believe in the practicability of electric propulsion that the motor is all right, but this has been the talk for a long time. Something more convincing is needed.

The State Department at Washington has just issued a pamphlet of 20 pages on the cultivation of the licorice plant, and its preparation for market, in England, Spain and other parts of Europe. Another similar pamphlet is devoted to the subject of pounding and polishing rice in England and Germany. Cuts are shown illustrating the latter.

One of the strongest features of co-operative manufacturing in this country is the quality of goods turned out. These shops seem to appreciate the importance of establishing a reputation for their wares. Hats, stoves, boots and shoes and other co-operative products rank high and compete favorably in prices.

The Brooklyn Navy Yard now gives employment to 1,243 men, being all that can be profitably employed.

Superheated Steam.

Two or three weeks since the following question was asked by a correspondent:

"If I should put a given quantity of water in a boiler, and convert it into steam, then if I superheat this steam would I get more pressure on the boiler?"

We answered:

"The pressure will increase with every degree of heat added to the steam, but in exactly what proportion has never been definitely settled."

Upon further examination of authorities we find that Nystrom, in *Steam Engineering*, makes an explicit statement in regard to the increase in pressure of steam heated in a closed vessel. He says that "a definite volume of saturated steam, superheated in a closed vessel without water [the conditions named by our correspondent] will obey the formula for saturated steam until the primitive pressure is increased 50 per cent,, when the steam becomes a gas and obeys the formulas for permanent gases." He shows, by example, that if a given volume of steam, at a pressure of 40 lbs., the temperature of which is 268.87° is heated to 294.7°, the pressure will be 60 lbs., the pressure and temperature in both instances being the same as those of saturated steam. Permanent gases are believed to double their pressure by an increase of heat equal to 491°. It appears to be very generally admitted that after the temperature of saturated steam has been moderately increased, it will, upon the application of further heat, behave substantially as a perfect gas, but we do not know that any author, except the one above quoted, explicitly states what its behavior will be upon the first application of heat. Rankine says, "experiments have shown that steam attains a condition which is sensibly that of a perfect gas, by means of a very moderate amount of superheating;" other authors say, in effect, that the addition of heat to dry saturated steam will increase the pressure rapidly up to a few degrees of superheat, and that then the superheated steam will follow, very nearly, the law of perfect gases. If Nystrom's conclusions are correct about the regular increase of pressure the same as for saturated steam up to 50 per cent., it is to be assumed that there is no water, as water, present in the steam, that is, that it is dry saturated steam.

When steam is superheated according to the common practice, for use in a steam engine, the pressure is not sensibly increased, because the communication is open to the boiler, and with the whole body of steam and water in the boiler. In this case the volume is increased, so that less steam is drawn from the boiler.

Rankine very clearly states the advantages of superheated steam, as follows: "1. To raise the temperature at which the fluid receives heat, and so to increase the efficiency of the fluid; and that without producing a dangerous pressure.

"2. To diminish the density of the steam employed to overcome a given resistance, and so to lessen the back pressure. * * *

"3. To prevent condensation of the steam during its expansion, without the aid of a jacket."

From this it may be concluded that if steam is superheated in its passage from the boiler to the cylinder, and by the waste heat from the furnace, a considerable saving may be effected.

Another Piece of Chalk.

By Frank H. Richards.

Mr. Hobart is mistaken—for once. I didn't make a "touching appeal" to him for help; or I didn't mean to. I wanted to make Mr. Hobart understand that the straightening of the twisted arithmetic was more his business than mine, but it seems that I was unsuccessful.

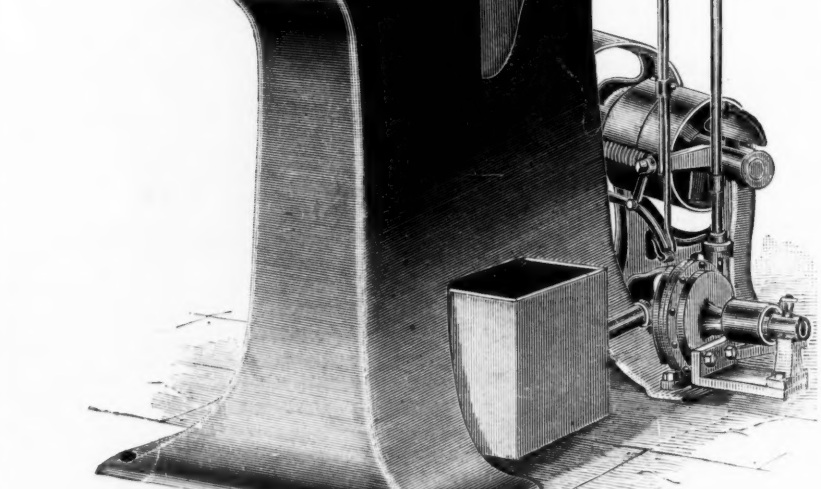
Bro. Hetherington says that "if a man has got anything in him, chalk will bring it out." He might found a new school of physics upon a truth as broad as that. Well, I find that I have another little piece of chalk in my pocket, and, for consistency, I suppose I should hurry and throw it away; but it may be just as well to wear it out, and so get rid of it most effectually.

I don't feel as if I had said all that I wanted to say on the chalk question. Chalk is too coarse and rough, too easily rubbed out, and, in general, too handy for machine shop use. If you want to get the best out of a fellow, don't make it too easy for him. Folks don't run down hill to success. Our friend, Benjamin Franklin, asks: "What is better than a piece of chalk to illustrate your wants, by making a rough sketch to show your blacksmith?" Where under the canopy could he have found me a better illustration of the demoralizing, degrading influence of a piece of chalk? We know how every living machinist derides and execrates a blacksmith's measures, and with considerable reason, in some cases. The vagueness—to put it mildly—of a blacksmith's ideas as to the location of the marks on a two-foot rule is proverbial. And how could it be otherwise? He is the victim of circumstances, and should thank me, and, perhaps, award me a medal, although I am painfully modest, for coming to his defense. You are always using your chalk upon him, and, of course, it makes its mark. You expect him to work to a chalk-mark, and then wonder and grumble because his minutest measure is a quarter-of-an-inch. Take a whitewash brush and draw your sketches for him, and he won't do as well as he does now.

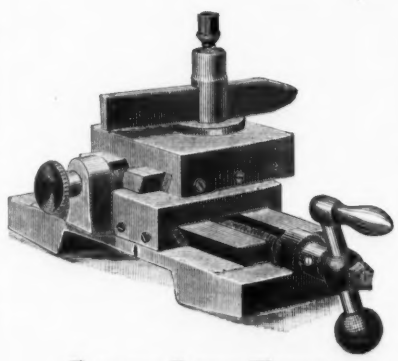
Chalk is valuable because it is so handy, and you can do things so easily with it. We know that it is much easier to cut wood than to cut iron, but don't we know just as well that that facility is fatal to minute accuracy? No one thinks of a wood-worker as a very close workman. Now I shall have the patternmakers jumping up and throwing things at me. Oh! dear; there's lots of trouble in this world! Well, if they do, I shall overwhelm them with compliments. No one has a greater respect for good pattern-work than I have. It is to the everlasting credit of the patternmakers that they do as well as they do under the circumstances. If it had fallen to my lot to be a patternmaker, I would have been a monumental disgrace to the trade. What a gorgeous and dazzling patternmaker Bro. Hobart would have made. If the patternmakers had to work to chalk marks, as the poor blacksmiths do, I suppose that half the machine shops of the country would be bankrupt. The tendency of the times seems to be against chalk marks. I notice that the lead pencil is driving out the slate pencil among the children in our public schools, and I expect more painstaking and greater precision as the result. So, in discouraging the use of chalk in the machine shop we are encouraging closer workmanship.

Bro. Hetherington's remarks call for the most respectful consideration. He evidently believes every word that he says, and I suppose that he puts his case as strongly as he can. I suspect that we both are right. I am speaking of the workman in the shop using his chalk in legitimate lines of machine-shop work. In the instances that our friend cites of the handiness of chalk, he does not put it into a workman's hands at all. He even goes so far as to bring Thos. Nast in, and I almost wonder that he did not think of the circus performer chalking his feet for the feat on the flying trapeze. Chalk may be valuable for rough memoranda and for hasty sketches. If it were necessary to relieve my mind any further upon the present occasion, I might remark that where chalk might be very properly employed for this purpose, it is very certain to be neglected, and so it becomes a compound, double-acting and unmitigated aggravation. The funniest thing about the whole business is, that those who are handy with the chalk where, as I contend, it is not best to use it, are just the ones who will not use it where they should use it.

I can show you the heads of planers and shapers, the backs of tail-stocks, the faces of



Emery Grinder.—*See Page* 1.



Tool for Truing Wheels.

chucks, and slides of all kinds everlastingly mutilated for purposes where a chalk mark would have been all-sufficient. We had a new vertical milling machine, Pratt & Whitney's, and the hubs of the wheels I had graduated for the convenience of the operator, and almost the first man upon it had to decorate the graduations with a lot of impromptu center-punch marks to show him where to stop, as though his job was the last and only thing the machine was ever to do. It is not in each or any specific case, but in a broad and general view of the use and abuse of chalk, that I would like to banish it from the machine shop.

I often watch a fellow trying to true up a piece—a rough casting or forging—in the lathe-chuck with the help of a piece of chalk, and it generally strikes me as a rather absurd performance. The operation seems to be guesswork all the way through. Anything that has not been previously turned is more or less out of shape, and if we do not want to waste material we of course want to bring the lowest spots equidistant from the center, and chalk does not touch the low spots, or say anything about them. Often the boys tell me that they have got a piece chucked as truly as it is possible to chuck it, because "the chalk touches at two opposites," when I can see at a glance that a low spot upon one side is an eighth of an inch lower than that upon the other. And this is no assumption of superior eyesight on my part, for the most inveterate chalker of them all, after struggling and guessing with the chalk till perseverance is transformed into a glaring vice, stands off and looks at it to see how it runs. Everybody expects to tell by the evidence of his eyesight whether a casting is chucked true enough or not. Eyesight is the bungler's *final* test, as much as it is mine. Why, then, doesn't he train himself to use it for his only test in cases of this kind, and not waste his time in the preliminary skirmishing? If your eye must approve it at last, the chalk is like the informal ballot in a political caucus, or the first of the series of jury trials that the defaulter has to stand now-a-days before they get him whitewashed. But they will keep right on doing it all the same. Fellows will keep on fumbling with chalk for 25 years, when they could have learned to chuck rough castings and such work by sight almost the first day. I have known them to pick it up very quickly when they have struck piece-work.

This, of course, is rough work, done by the readiest means. I am saying nothing against the dead-sure method, where that is necessary. If you must chuck a casting accurately take the point of a tool and set it by that, and know what you are about. Walk along like a little man that can see his way, and don't be pawing around in the dark. A tool, or some rigid point close to the work, will show you with certainty just how much a piece is out, and you can tell how much to move the dogs almost the first time. In the case of turned work to be rechucked, chalk is almost absolutely useless. It will not mark upon a smooth surface, and it will not detect slight eccentricities, and the point of a tool is necessary. I say a point, but a V-point is not as good as a flat-ended tool for the purpose.

A chalk mark is so coarse that it is illy adapted to any machine work. On account of the breadth and general vagueness of it, it does not generally locate anything any nearer than a quarter of an inch. And when you use chalk to make a surface upon which to place the marks of a scratch or lead pencil you are generally in trouble, and find your marks obliterated before you can use them. I suppose everybody has chalked the surface of a casting and scratched the location of holes upon it, and then had chalk and sand all fly off together before half the holes could be center-punched.

There is a good deal of nonsense and waste of time about much of the so-called "laying out" of work that men do. No very fine work is ever done by scratching a line and then working to it. There is a double chance of error; first, in locating the line, and then in cutting to it; and while some, of course, will do much better than others, none will be perfectly accurate. Generally they make the chance for error three-fold, instead of double. They scratch a line about right, and then they prick-punch it as near as they can, and get as close as they can to the punch marks, and then guess that that will do. How difficult it is to work to a line in planing, almost every one has realized. If your line is upon the front end of the work, a rag will come down over the line and conceal it, or the corner will tear off and carry the line with it. If the line is at the other end of the piece, the corner will keep good, but you can't get at it to see whether you are right or not. There are so many cases of this kind where a little strategy is so much better. It takes military genius, and many other kinds of genius, to make a first-rate machinist. In the olden time I used to turn up stub-ends for valve-rods, and they used to require me to mark two circles on the end to plane to, one for the width and one for the thickness. When I got to planing stub-ends I didn't want any circles on mine. I set my tool the required distance from the turned neck, and planed them more accurately. The other day I had a fellow turning some cast gears. There was a web in the center of the gear, and the teeth were faced to 1½", and the hub was to be faced to project 1" beyond the face of the gear on each side. The gentleman was chalking the hubs of the gears, and then making a scratch mark to coincide with the face and measuring off an inch from that, and then making another scratch and trying to work to that, while he had lying on the board at the minute a straight-edge exactly an inch wide, which would have been all that he wanted, and he might have saved his chalk and his time for more important uses. These, it may be, are trivial instances, but they could be multiplied indefinitely, and the thing that they should illustrate, the value and necessity of alertness of mind to achieve the best success in the various operations of the shop, is not trivial. If any one is disposed to think that I am all wrong on the chalk question, let him look around a little more in the direction that I indicate and see whether chalk is really so indispensable.

Clean the Shop Windows.

The days are getting short. It hardly pays to light up at a quarter to six. The boys can't see to do much, so they tell stories and kill time.

Wash up those windows and your shop will be lighted 10 per cent. better and longer. Let out the job to two men; put one inside and the other outside on a ladder, or with a window stage. One man can't clean windows to advantage; two men will do it well and quickly. While you are about it, give the inside of your shop a coat of whitewash.

Recent experiments in England with coal oil for fuel in torpedo boats do not seem to be successful. The smoke and smell from the oil was said to be highly offensive, and the boilers did not steam well.

Box Nailing Machine.

The box-nailing machine shown in the engraving is designed to meet the wants of box manufacturers and other industries using large numbers of boxes, such as canning establishments, starch factories, salt manufacturers, etc., etc. The general construction of the machine can be plainly seen from the engraving. The machine is readily adjustable for all sizes of boxes up to 20″ square. The nail guides are also adjustable so as to locate nails the proper distance apart. The dotted lines show the position of the box on the bed of the machine. By a simple arrangement of rack and worm shown at *L*, combined with the operating treadle, the lumber to be nailed is always held tight against the nail guides, while driving the nails, thus insuring all nails being driven uniformly flush with the surface of the lumber. The first operation of the treadle is to grip the box as described, and then to engage the clutch-gear with the driving pulley which drives the nails and also feeds another nail in each of the tubes ready for another operation.

In the engraving, *A* is the nail box, *a* nail in passage, *B* cut-off, drops one nail in tube, *C* box to catch waste nails, *D* nail tubes, *E* support for nail guides, *F* nail and hammer guide, adjustable on *E*, *G* support for end of box, *H* adjustment for *G*, *h* bar operating cut-off, *J* sliding ram, adjustable for any size box, *L* worm to operate ram, *n* shows nail emerging from guide, *R* tripping rod, *T* treadle.

The machine being adjusted for size of box, thickness of stuff and location of nails, which can be done very quickly (in a few seconds), an end is placed on bed and a side against the face of nail guides. Movement of the treadle first moves forward the ram which grips the box; the rear end of treadle then lifts *R*, which engages the clutch with driving-wheel and drives the nails, at the same time the cut-off *B* feeds another set of nails into the guides ready for the next operation. Releasing the treadle, releases box.

Made by Avery & Lipe, Syracuse, N. Y.

Darker's Shop.

By James F. Hobart.

Last week I visited Darker's shop. Darker makes hoisting engines, and sawmills, and corn-shellers, and water-wheels. He repairs mowing machines and apple-parers, steam-engines and sewing-machines. Darker was a dark looking man, and he had the darkest shop I ever saw.

Two miserable windows were filled with cobwebs, and core-boxes, and broken glass. Darker's shop never saw any white-wash, but every lathe had a loose-jointed gas fixture, generally without a tip.

Most of Darker's men had "petticoat" lamps; the rest of them used tallow candles and hot-pressed nuts.

When a man wanted an arbor in Darker's shop, then the fun began. Our man lit the nearest burner to the arbor heap, and began to hunt, with lamp in one hand and calipers in the other.

A petticoat lamp is a good thing to have, and that is all it is good for. Our man lost his light in hunting for that $1\frac{15}{16}$ arbor, and needed two candles to find it.

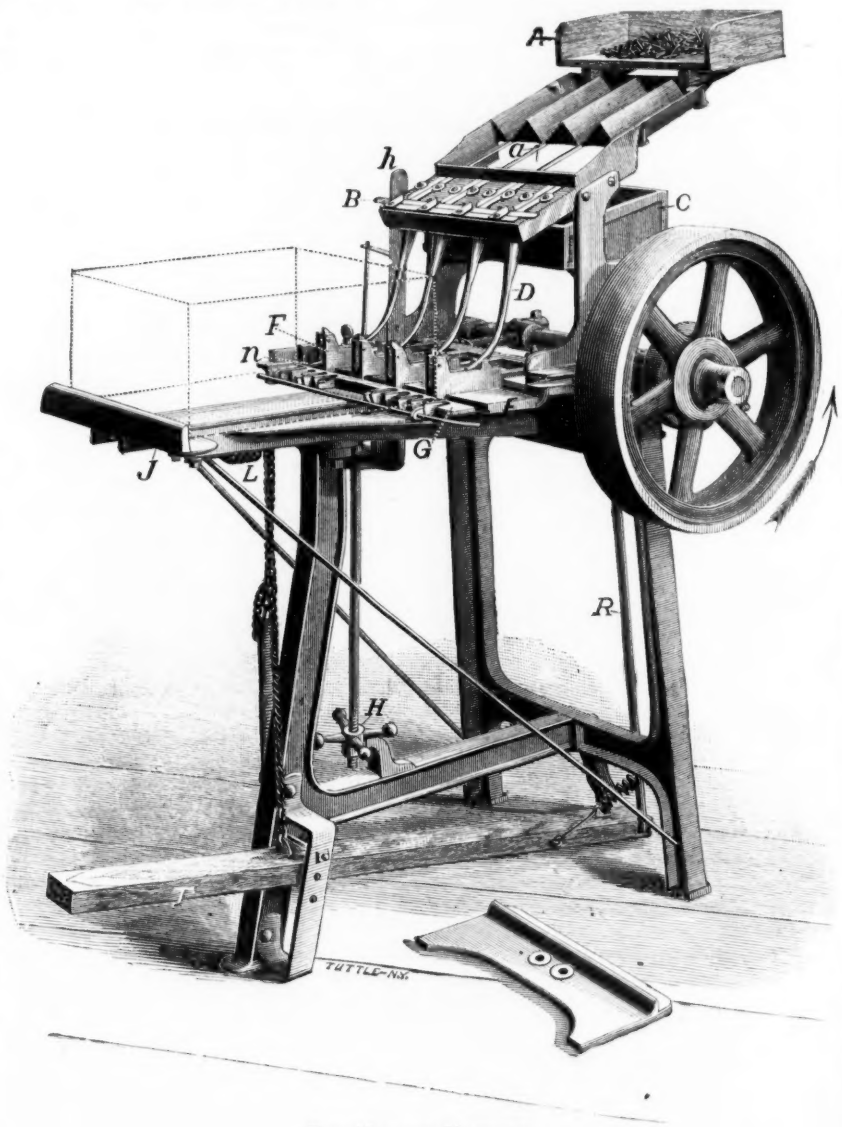
Darker's tool-room is an original. It has got three brick walls and one iron door. Darker don't make his tools in there, he only keeps taps and dies, and wrenches, and reamers, and gauges and such things in there. He has got six good gas-burners in that room, and the men always leave them in full blast.

Darker got sick of that business. It cost him 72 cents every day to light up that miserable tool-room. He cut that gas pipe, ran it right up beside the door, and put in two tees with a plug valve between them, then he piped out a branch from each tee and connected them through another plug valve which could only be turned by a key kept in Darker's pocket. Darker shut the main valve, lit the gas and turned down on the little branch-pipe valve until each of those six burners gave a little blue flame $\frac{1}{4}$″ long.

Next, Darker put a long handle on the main valve and ran it clear across the door into a latch catch. When out of this catch, the lever would fall down plumb, and shut the main valve.

When one of Darker's men wanted a $\frac{15}{16}$″ reamer, he would slip into the tool room, and lift the latch up into the catch. That turned on the gas, and all was O. K. Darker watched the racket from the office. "I've got that down fine," thought he. Just then the man came out with his tool. "He'll drop the latch and the lights will go down," thought Darker. Not a bit of it. That chap bobbed his head, came out under the latch, and left the gas business rushing.

Darker looked tired. He lit a fresh cigar, took off that latch, drilled two $\frac{3}{8}$″ holes through it 14″ apart. He put a $\frac{1}{4}$″ wire



Box Nailing Machine.

through those holes, and let it hang down loose in the shape of an ox bow.

Darker had it! The boys must lift up the bow to get under. It was too much work. They would let down the latch and save the gas. "Guess I'd better rig one to every lathe," said Darker, "then they would turn down the gas when they went to the grindstone or the tool-room.

Darker has got another good rig on his elevator. It runs up and down in the middle of that dark shop. One day it came down out of the darkness, and lit on Darker's back, while he was stooping down under it hunting around on the floor for a piece of dark tobacco.

Darker got mad and rigged a bell on the elevator post to ring automatically when the elevator came down.

Don't work in a dark shop. Work costs too much when it is done there. Some men will "sojer," and "Tom" can't half see to grind, or to use the tool after it is ground.

The wear and tear of a busy line of railway is far more than might be expected by those who have never gone into the statistics; but some recent calculations in connection with the North-Western Company's system serve to show both the work made and the work done by a railway, which, if not the longest in the United Kingdom, probably does the greatest amount of business. The total number of miles of the London and North-Western now reaches the large figures of 1,725 miles, which is less than the Great Western by a few hundred miles, but the traffic is enormous. There are altogether 2,347 locomotives, and the total mileage last year amounted to close on forty-six millions, or about one mile and a half for every second. It is calculated that collectively the locomotives on this system accomplish a distance equal to the circumference of the earth in each period of four and a half hours. Steel is used largely on the line for all purposes; but for rails only at least 20,000 tons is required every year, and every mile run involves an actual loss of about a third of a pound, and three-quarters of a ton are lost every hour of the day. The wear and tear of the engines corresponds; and, roughly, about seventy new locomotives are required every year. The life of a locomotive is measured by the number of miles it has run; but reckoning it in years, it comes to about thirty, during which time it has had nearly every part except the frames renewed more than once. Little more than half a century ago railways were practically unknown, and their introduction was fiercely opposed by the landholders; but the above figures show conclusively that the railway system, which did unquestionably ruin the coaching trade, provided work for millions, and added immensely to the general prosperity of the country.—*Echo.*

Live Labor Subjects to be Discussed.

The Constitution Club, of New York City, will devote its weekly discussions to the consideration of the labor question. The following questions will be submitted in rotation to the consideration of the club:

I. MEANS TO PROTECT THE LIVES AND LIMBS OF LABORERS.

1. Factory and Mining Legislation in America and Europe.

2. What branches of Industry should be subject to Legislation?

3. What class of persons should be protected?

4. Should employers be compelled to provide means for the protecting of their laborers' lives and limbs?

II. MEANS TO PROTECT THE ECONOMIC CONDITION OF THE LABORING CLASSES.

5. American Methods—European Legislation.

6. Should benefit insurance be voluntary or compulsory?

7. The Laborers' Tenements—Should capitalists, municipalities and the laborers themselves be compelled to keep them in a healthy condition? American and European Legislation on the subject.

8. Postal and other Savings Banks.

III. MEANS TO PROTECT THE DEVELOPMENT OF THE MORAL LIFE OF THE LABORING CLASSES.

9. The Truck System—American and European Legislation on the subject.

10. The Time of Labor.

11. Co-operation. Industrial Partnerships.

12. Compulsory Education. Truant Laws.

13. Employment of Children and Married Women.

14. Compulsory Apprenticeship — Into what trades should it be introduced?

15. Technical Education, Club-houses, Libraries.—What voluntary exertions have been made in this respect?

16. Workshop regulations—Should they receive the sanction of the State or not?

IV. MEANS TO CARRY OUT THE LAWS.

17. Is the incorporation of Trades Unions as organs to preserve order in industry desirable? European Legislation thereon.

18. Should an Industrial Code for the regulation of all difficulties be uniform in all of the United States? Labor Laws of the States compared.

19. The State Labor Bureaus—What they are doing and how their efficiency may be promoted.

V. ARBITRATION.

20. American and European experiences on the subject.

21. Under what conditions can the decisions of Courts of Arbitration be enforced by the State?

VI GENERAL CONSIDERATIONS.

22 The State *versus* the man.

23. Labor organizations in politics.

24. Benefits and mistakes of labor organizations.

25. What has been and what can be accomplished by labor organizations.

The Sugar Industry Languishing.

A first-class sugar house to-day, turning out 3,000,000 pounds of sugar, will perform the work of ten of the average old-fashioned ones, working only one-fifth as many operatives as they, using only half as much fuel, requiring only half the outlay for machinery, building, etc., while the sugar it produces will be of far higher grade and consequently far more valuable. When it is considered further, that from 1,200 or 1,500 acres such a factory will turn out as much sugar as the smaller mills will obtain from 2,000 to 3,000 acres, the comparison between the two systems, the old and the new, will be fully understood.

Such is the problem of sugar raising to-day in Louisiana. There is no doubt of the superiority of the larger and more thorough mills, no doubt that they can make sugar more cheaply and at greater profit. But the difficulty lies in the lack of capital, of which there is not yet sufficient, or, at least, it is still too timid to embark in the industry. When this difficulty shall have been solved, and the planters shall have perfected a few other changes and improvements now under way, we may hope for a complete revival of sugar growing in Louisiana.—*New Orleans Times-Democrat.*

A correspondent of the London *Times* has discovered a source of danger in wrought-iron railroad bridges. He says that when many of them were built the weight of a locomotive was only two-thirds as much as at present, and that the iron work has naturally been growing weaker.

The Advance Traction Engine.

This engine, illustrated herewith, is made by the Case & Willard Thresher Company, Battle Creek, Mich. In its design it is evident that the end has been kept in view of keeping the construction simple, and at the same time providing for the economical use of steam, and for reasonable assurance against break-downs. It presents, as will be seen from the engraving, a very neat appearance.

The cylinder is of the overhanging type. It is a separate casting, bolted to the end of the frame, and is thus free to expand, from heat, without straining itself or the other parts. The crank disk is of sufficiently large diameter to permit balancing up to the full extent found to be desirable. The crosshead is provided with adjustable gibs; also with a steel pin, which can be easily replaced with a new one, should it be necessary.

The manner of distributing the machinery on the boiler is somewhat different from the ordinary practice in this type of engine. The theory upon which this distribution is made is that too much weight may be placed upon the driving wheels; that when this is the case, the wheels sink in the ground where it is soft, and that the engine cannot be properly steered; also that the distribution should be such as to avoid, as much as possible, local strains on the boiler. In this engine the crank-shaft is directly over the countershaft; this, it is claimed, avoids undue strain on the seams at the attachment of the fire-box. The arrangement of the engine on the boiler is such as to permit the steering apparatus to be placed at the right-hand side; this enables the operator to have the working parts under his eye at all times.

In the traction gear used the pinion remains in gear at all times. The pinion is mounted on a sleeve on the engine shaft, and is thrown into or out of driving connection by a substantial and simple device.

The boiler is made of No. 1 charcoal hammered iron, and is fully provided with safety attachments. The crown sheet inclines down and backward, to insure its being covered with water in going downhill. Steam is taken to the engine through a dry pipe from near the top of the dome. This pipe passes inside the boiler to the front end, to the smoke chamber; then up to the smoke pipe a sufficient distance to turn in line with the governor. By this means slight superheating, or at least evaporation of water carried along with the steam, is accomplished. The boiler is of sufficient capacity to make steam, with a large exhaust nozzle, which correspondingly reduces the back pressure in the cylinder. A spark arrester of approved design is used.

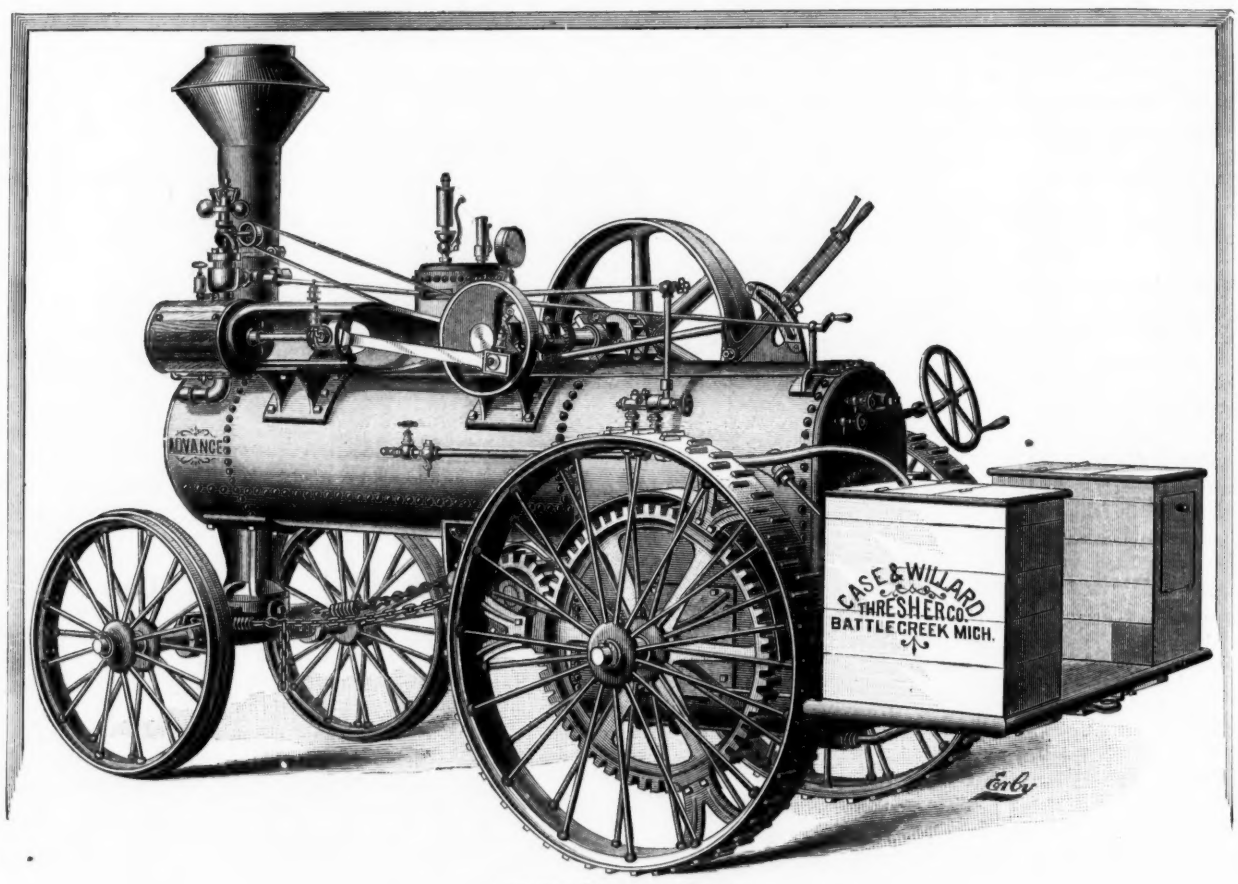
The piston is fitted with self-adjusting packing rings, requiring the use of neither springs nor studs. The shafts, rods, including connecting-rod, pins, etc., are of steel. The boxes are of babbitt-metal. For relieving the cylinder of water, connection is made with a three-way cock leading to the smoke-box; this is to avoid noise on the road likely to frighten horses.

We also show a pair of diagrams that very clearly illustrate the steam distribution. It will be understood that the cut-off is fixed, and that it takes place at a point in the stroke just sensibly later than at half stroke.

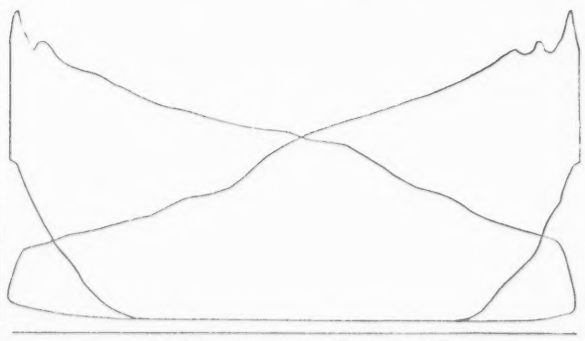
The data for these diagrams are:

Diameter of cylinder	7½″
Stroke of piston	10″
Revolutions per minute	212
Boiler pressure	95 lbs.
Spring	40 "

The engine from which these diagrams were taken is rated as a 10 horse-power, but was developing at the time nearly 13½ horse-power by brake, and it is plain that this work was none too much. They are remarkably good diagrams for this type of engine. Initial expansion, together with the expansion due to cut-off, reduces the terminal pressure, until, figuring the steam accounted for by the indicator, it is seen to be only about thirty pounds per indicated horse-power per hour. The compression is such as should bring about smooth running, with the back pressure very low, when it is considered that in engines of this kind the exhaust must be used to create draft.



Advance Traction Engine.



Indicator Diagram from Traction Engine.

A Decision of Importance to Inventors.

A case has recently been decided by Judge Cullen in the Supreme Court of the State of New York which involves a principle of great importance to every inventor who devises something new while in the employ of another. It is the first case of the kind ever decided by the courts, and the decision is a surprise to many. The findings are as follows:

In 1883 Joseph Annin was devising methods by which to construct wheelbarrows and hand trucks, using iron tubing for the purpose. Ill-health caused him temporarily to suspend the work. He came across William C. Wren, a patent solicitor with an aptitude for inventing, who had made valuable suggestions to him about the barrows and trucks. Annin's partner, John S. Elcock, was consulted, and Wren was engaged at a salary of $18 a week to devote himself entirely to the developing of plans in connection with the barrows and trucks. Wren made a rough draft of a hand truck which Annin proved. Hereafter Wren assisted in and supervised the construction of patterns for castings, all the while using the shop, tools and facilities of Annin, and directing the mechanics employed by him. After this Wren supervised the construction of several trucks, which were offered for sale and placed on exhibition to the trade.

As the work progressed and expenditures increased, Annin set up a separate shop for the making of barrows and trucks, and placed Wren in charge, the design being to organize a corporation, and by procuring outside capital develop the business and place large numbers of the articles on the market. By Annin's direction Wren devoted himself to the invention and construction of machinery specially adapted to facilitate the manufacture, being all the time under Annin's employment at a fixed salary. During the latter part of 1883, knowing that Annin claimed to be the owner of the patentable features of the inventions covered by the trucks, and without his knowledge, and secretly intending to deprive him of his property, and with a view of obtaining letters patent in the name of his brother, Geo. Wren, W. C. Wren employed a draftsman to make drawings from the trucks to accompany an application for letters patent, and on November 30, 1883, made such application, and then assigned the invention and his rights to letters patent to George Wren, to whom letters patent were issued on January 29, 1884. All through Annin had fully disclosed to W. C. Wren all particulars, and placed at his disposal all the models and results of experiments, reposing confidence in him and believing that any patentable invention which he should devise would belong to him, Annin, and be to his own especial benefit. The application and assignment were made by W C. Wren with the fraudulent purpose of depriving Annin of the benefit of the invention, and George Wren accepted the assignment with the full knowledge of his brother's fraudulent intention, with a like purpose on his part.

As matter of law, the court finds that at the time of the invention covered by the application, drawings and letters patent Annin was and still is the equitable owner of the invention, and that on the filing of the application W. C. Wren was justly bound to assign it and the rights covered thereby to Annin. It finds that George Wren acquired no rights by the letters patent, and is in equity and conscience bound to assign and convey it to Annin, and that Annin is entitled to judgment; that George Wren assign the letters patent and all rights thereunder to Annin upon demand, and that he be forever enjoined from using the invention, and that W. C. Wren likewise be enjoined from asserting any right or claim under the letters patent.

Locomotive engine building is beginning to look up.

Painting Ironwork.

The point of prime importance, says the *Painters' Magazine*, is the actual condition of the surface when ready to receive the first coat. Upon this point rests the success or non-success of subsequent applications, for if not in proper condition no paint will prove permanently preservative. Now, the best state is that where there has been formed upon the surface of the iron a film of black oxide, which has been, while hot, thoroughly permeated by and incorporated with a resinous or tarry covering. This covering insures perfect success, and its thickness may be increased from time to time by additional coats of paint. If, however, a layer of hydrated oxide (ordinary rust) be once allowed to form, the successive coats of paint will fall off, their separation from the iron being merely a question of time. During the time, also, the rust has been spreading under the paint. An instance of this may be seen after outdoor riveted work has been in place for some time. Usually all the riveting is done before the final painting is begun, each rivet-head, in the meantime, being exposed to a damp atmosphere; the paint begins to peel off the rivet-heads long before it leaves the adjacent plates, and, when this occurs, nothing but thorough scraping will give the paint a chance to adhere again. So slight are the differences of manipulation which determine whether a given piece of work shall or shall not rust away, that they may all be found in the different methods of manufacture pursued now and formerly.

Taking the case of a piece of ornamental ironwork, which in so many instances has come down to us in unimpaired beauty and condition, it would now, probably, be forged in detail in one part of a factory, drilled, filed and fitted in another, and when completely finished, be painted in three coats of best oil paint. Formerly the smith who forged the work punched the necessary holes at the same time, fitted his various pieces together as he went on, completing each piece as he proceeded, doing all the work with his hammer, and, to quote an old book of directions to good smiths, brushing his work over with linseed oil, and suspending it for some time over a strongly smoking wood fire. This will give at once a sort of elastic enamel coat, perfectly adherent and calculated to preserve the iron to the utmost. Of course ironwork to-day is not made to undergo any such preparatory process, and the consequence is that we find it very difficult to produce good results in painting on iron surfaces. But it is pretty well established that the very best finish coat for iron is found in red lead, upon which any desired shade of lead paint may be placed with the best possible results.

The Brooklyn *Real Estate Review* says:—"The year 1885 will always be remembered in the history of Brooklyn as the most remarkable for the activity among the builders and real estate operators. Miles upon miles of new houses have been erected, and by the expiration of the year fully twenty millions of dollars will have been invested in the improvement of vacant property. It is worthy of note that the capital that has thus been invested has come largely from other cities than our own. New York, Philadelphia, Boston and Hartford, have all contributed their proportion."

Mills' Button-Hole Attachment.

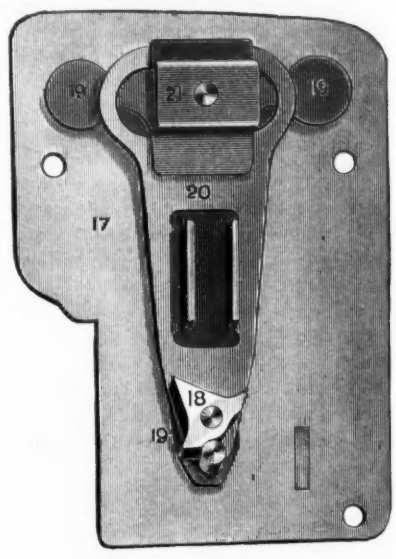
Machines for working button-holes, expensive and complicated in their construction, and requiring special skill to use and keep in order, have for some time been in use in the manufacture of linen goods, but what has been wanted is an attachment that can be readily placed on any machine either in the manufactory or for family use, the same as any other of the various attachments used on sewing machines. The engravings which we present herewith represent such an attachment, made by the Mills Button-Hole Attachment Company, 312 Stock Exchange Place, Philadelphia, Pa.

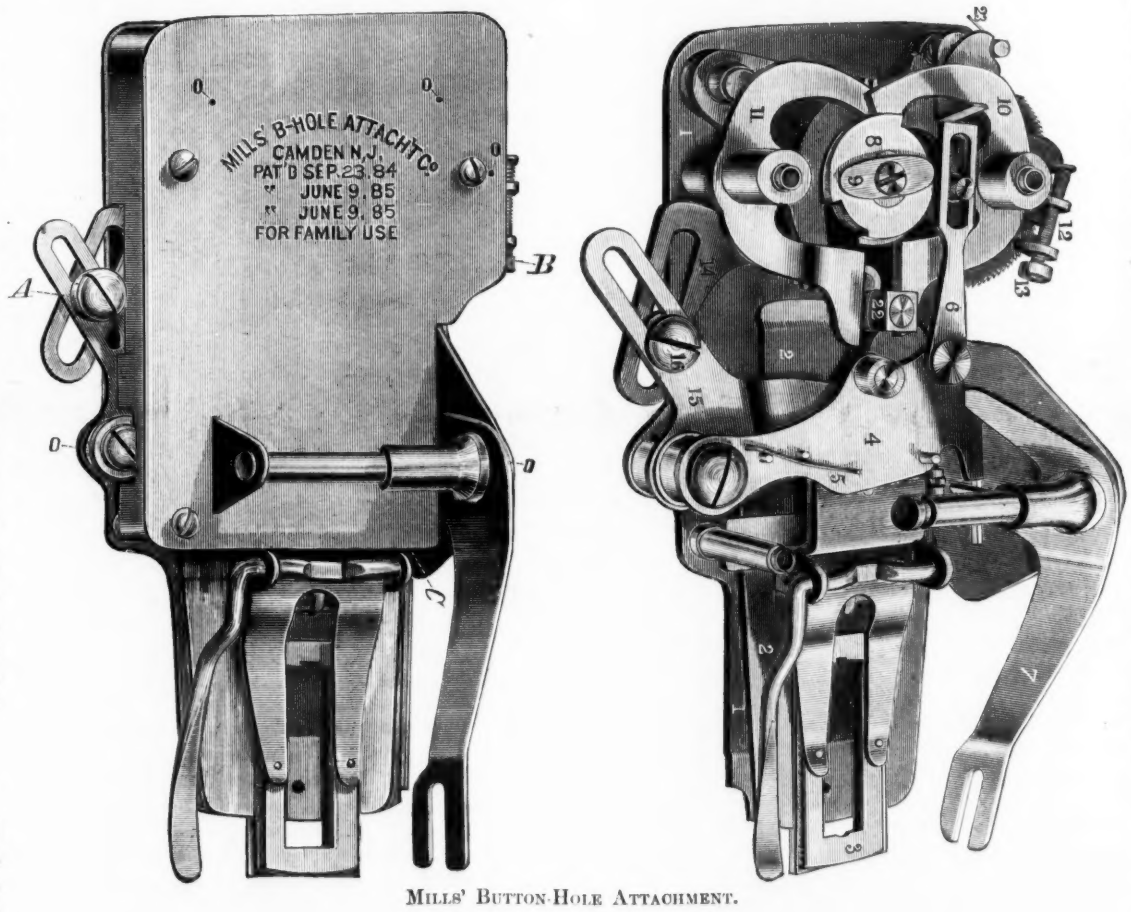
This attachment can be readily placed upon any ordinary sewing machine, without alterations of the latter, and when so placed, can be adjusted as to length of hole, width of bight and fineness of stitch. If required, it can be adjusted to make a bar at one end and a plain round end at the other, or it will make a perfect bar at each end, which can be as wide as desired, without regard to the width of the button-hole. It will make the button-hole the same distance from the edge of the material, regardless of the length of the hole, and will work on all kinds of goods

Referring to the full-view engraving, to regulate the length of the button-hole, the screw *A*, at the left, is loosened, and pushed back to shorten the hole, or drawn forward to lengthen it. Screw *B*, at the right, is for regulating the fineness or coarseness of the stitch. The width of the hole is varied by means of screw *C*.

The attachment is simple in construction and arrangement, is entirely automatic in its action, and can be operated by any one who can use a sewing machine.

In the detail engraving, 1 is the base, 2 the vibrator, 3 the cloth clamp-slide, 4 jog lever, 5 switch spring, 6 jog feed link, 7 bell crank, 8 formers and feed cam, 9 friction spring, 10 and 11 former levers, 12 feed adjustment, 13 feed adjustment screw, 14 and 15 feed levers, 16 adjustment screw for feed levers, 17 top plate, 18 switch, 19 switch lever, 20 switch friction plate, 21 switch plate cap, 22 switch former block, 23 dead pawl spring.





MILLS' BUTTON-HOLE ATTACHMENT.

The Humbug Postal Notes.

The law creating the postal notes for sums under five dollars is a delusion and a humbug. It should be repealed by the next Congress. That law was enacted as an evasion instead of a response to the public demand for a safe and convenient method of sending small sums of money through the mails. Events show that a considerable portion of the people believe the postal note to be safe, but it has no element of safety about it. It is not convenient, for it requires a visit to the post-office to have it issued, and a visit to the paying office to get it cashed. Then it costs three cents, while postage stamps can be enclosed for fractional parts of a dollar without any expense. Furthermore, if the note is not presented for payment within three months from the last day of the month of issue, the amount is confiscated by the Government, and the holder has a worthless scrap of paper.

We recently made inquiry of the Post Office Department at Washington, whether the amount represented by postal notes, lost in the mails and not presented for payment, could be recovered by having duplicates issued to the parties originally buying the notes. As the answer is of public interest, we present the matter (as written by the Superintendent of the Money Order System) to prove our position as above stated. The law puts the Government in the position of holding on to property it has no honest title to, a position from which it should recede:

In reply I have to inform you that a duplicate cannot be issued in lieu of a postal note which is lost, inasmuch *as every such note is drawn payable to bearer*. A duplicate postal note can be issued only when the original has become invalid by law—that is, when it has not been paid within three calendar months from the last day of the month of its issue, and, in that case, the original note must be delivered to the issuing, or to the paying postmaster, to be by him forwarded to this department with the application for the duplicate, which duplicate must be issued to the person making application therefor and presenting the invalid note. The reason for this is plain. The law, designed to meet a certain want, provides that the postal notes shall be payable to bearer, and they are transferable from hand to hand without endorsement. Each note is distinctly an order to "pay to bearer," and on the face of each is the printed cautionary notice to the purchaser in these words: "If lost or destroyed no duplicate can be issued."

It follows that the loss by destruction of a postal note is precisely such a loss as would be occasioned by the destruction of a U. S. Treasury note; the loser has no remedy. It is in this respect that the postal note mainly differs from the money order, which, for a larger fee, may be issued for a like amount in favor of a person designated by the remitter, and may be duplicated at any time, if the original has been lost or destroyed.

Excavations at Olympia.

The excavations at Olympia are to be recommenced immediately under the auspices of the Archæological Society of Athens. On these excavations the German Government has expended so far a million marks, £20,000 more than is generally supposed, the sums voted by the Reichstag and granted by the Emperor having been supplemented at a later date by a large bequest from an unknown quarter in Berlin. It is declared by those best qualified to judge, that two-thirds of the site of Olympia still remain to be excavated. The Germans themselves, however, seem to be glad to have done with the work, as they have cleared out the principal parts where the richest harvest of *trouvailles* was expected, while nationally they have derived very little profit from the undertaking. They think they made a great mistake in stipulating only for duplicates of what they found, as, of course, no important objects existed in duplicate. They fancy that nothing of any great artistic value can now be found in the vast area of the Stadium or in the other outlying structures; but the Greek society has determined to clear away the vast mass of superincumbent earth, and to bring back the whole site to the original level, so that the lines of ancient Olympia may be clearly discerned. The local museum, the gift of a patriotic Greek gentleman, is a large building now roofed over, and is being plastered. In a few months it will be ready for the reception of the statues and bronzes already found.—*Athenæum.*

It is said that eighty per cent. of the iron and steel works of Pittsburgh have begun the use of natural gas as fuel. Many towns throughout the coal and oil regions of New York and Pennsylvania are putting down net works of pipe to carry the gas from one point to another. Means of conveying it to the seaboard and to distant cities have been proposed, and if the supply is inexhaustible, as some think, it will materially affect the future of the coal trade.—*Wheeling Register.*

The Brotherhood of Locomotive Firemen visited the Novelties Exhibition in a body Thursday evening, September 24. They were welcomed by Chairman Heyl, who entertained them with a review of the history of the Franklin Institute, in connection with railroad construction and operation. F. W. Arnold then delivered an interesting lecture on the modern locomotive and some of its defects, calling attention to imperfect balance in the driving wheel.

Screws have advanced ten per cent., and wire ten to fifteen [per cent. After a while we shall hear about advances in prices of machine tools, engines and boilers.

LETTERS FROM PRACTICAL MEN.

Brown's Method of Building a Boiler According to Specification.

Editor American Machinist:

Much has been told about the cheek of the army mule and the New York drummer; my opinion is that they are far in the background, and deserve sympathy when brought in contact with the cheek of an old boiler-maker determined to use the same for his own interests, regardless of those of his customers, as was lately illustrated by my old friend Brown in making a stationary boiler of the locomotive pattern.

I would not probably have been aware of any of the facts in the case had I not been consulted by the aggrieved party, who, knowing that I had a long acquaintance with and firm friendship for the old gentleman, thought I might influence him to act honestly in a matter with which I really should have had nothing to do.

It seems that Brown took the contract to build the boiler referred to, guaranteeing to live up to the strict letter and spirit of the specification, which was carefully drawn up by an eminent mechanical engineer, and which fully stated the thickness and quality of the iron, giving fire-box quality for fire-box, C. H. No. 1 shell for the shell, and C. H. No. 1 flange for all places where flanges had to be turned. The specification also stated that all work and material were to be satisfactory to the aforesaid mechanical engineer, who had authority to reject any and all of such work and material if deemed unsuitable for the purpose intended, and evading the spirit of the specification. The iron for the boiler was ordered from the mill, but, failing to arrive as quickly as Brown thought it should, and having a limited contract, he set his wits together to overcome the delay and get his work out on time. To this end, he picked up all the available pieces in the shop, regardless of quality or thickness, and proceeded to manufacture a substitute for the specified work. The fire-box was made in five pieces; that is, two heads, crown sheet and two sides; these not being quite large enough for the purpose intended, the furnace dimensions were altered to suit the pieces and the furnace formed.

The throat sheet was made of a piece of iron of unknown quality, so far as stamps were concerned, but the quality was plainly manifest after the flanges had been turned, the same showing *more than five cracks*, especially in that part which connected to cylinder. On this latter flange being punched, cracks were also visible from edge of hole to edge of sheet, notwithstanding which my old friend proceeded with his work as calmly as though every part of his specification were followed to the letter.

A visit from the mechanical engineer was followed by explanations and volleys of profanity. Brown argued that a boiler built in that way was in every respect far stronger than if built according to specification, as the furnace was ordinarily in danger of collapse, and the additional seams of rivets added additional strength.

"I am making you a first-class boiler," said my friend, "at an additional expense to myself, as every extra seam requires additional labor in holes to punch, rivets to drive and caulking to do; and you, without practical knowledge of the business, have nerve enough to tell me the thing is not good enough for you, and you won't accept it! Why, if I were making it for father or brother, I could not be more particular or attentive to it than I have, and I will stand a lawsuit and years of law, but what

I will compel you to accept this job."

The old man's attention was called to the defects in throat sheet already referred to, but he claimed they were no detriment to the boiler; the iron was best flange, and he knew it, and his contract would not allow him to make any change, his time being limited. He professed a willingness to submit his work to the opinion of the other boiler-builders in town, and abide by their judgment, and was promptly taken up by the mechanical engineer, who, sure of his position, felt confident of the condemnation of the work by Brown's rivals. Profanity, loud language and personal abuse having no effect, the old man, like Crockett's coon, wisely decided to "come down" from his position, and his time was extended to insure the arrival of proper material, and Brown started on boiler No. 2.

The mechanical engineer, disgusted with Brown and his methods, abandoned the inspection part of the business, a boilermaker was appointed in his place, and even then Brown, by working nights, tried to use second-hand tubes, but was caught in the act.

I wish I had no knowledge of this phase in Brown's character; it has weakened my confidence in human nature, but "Joe" consoles me with the cheering intelligence that "I don't know the old man as well as he does; if I did, I would visit the shop oftener, or else stay away altogether." Ancient.

Gang Milling.

Editor American Machinist:

Great advantages are gained by the use of milling cutters in a gang for grooving work upon flat surfaces where a number of grooves are required, both in the matter of time consumed in doing the work (as all the grooves are cut at one time) and the accuracy gained, provided the milling cutters are in proper shape. This process of milling seems very simple and very easily done, which I thought was the case before I tried the same. But I found in cutting small grooves, whose spaces or ribs, which are left standing, are as wide as the grooves, and the sides parallel from top to bottom, that it was not so easily done; that is, to produce smooth sides on the grooves, and also to insure all the cutters of the gang to be whole when the cut is made. The chief trouble in the grooving referred to was that the cuttings would be carried around by the cutter, being greasy with the oil used (the material cut was steel), and many would project over the side of the cutting edge, and when entering the groove again the chip became wedged between the side of the groove and the cutter, which would either score up the side of the groove, making it rough, or would wedge so tightly as to cause the cutters to be broken, causing trouble and general dissatisfaction as well as expense. With a single cutter we do not find so much of this trouble, from the fact that the stream of oil or soda water supplied will wash the edge more clear of the cuttings, but in a gang where the cutters are close the cuttings in coming off one cutter will partially lodge on the other, and therefore are in a good position to be wedged between the cutter and the side of the groove with the result named.

The work I groove has grooves of $\frac{1}{8}''$ wide and $\frac{3}{16}''$ deep, and spaced $\frac{1}{4}''$ apart, or the groove and the rib are of equal width ($\frac{1}{8}''$), so that the two pieces, when milled with the same gang, mesh into one another closely.

Now, the only plan to produce smooth work and insure safety of the cutters I found was to remove these cuttings in some way, so that they would not be carried around. I first tried brushing by hand, which worked much better, but did not give the smooth work desired, and, besides that, it was a very tiresome job to perform. I then arranged my jig in a pan, with a large opening on one side, fixed a pipe above the mills with as many holes as there were cutters and spaces between; this formed jets for each cutter and each space. To this pipe I attach a hose from an oil pump (double acting), which gave (by the use of an air chamber) a steady stream of oil through these jets (which are small, to obtain force) at a good pressure. These jets of oil strike the cutters on an angle downwards as the cutters come out of the work, which knocks off the chip from the cutter, and the jets, striking between the cutters, keep the chip out of that place; consequently, I have clean cutters when the teeth again enter the work, and the result is no scoring of the sides of the rib, no danger from breaking the cutters, and a means by which the heat is practically all carried away, insuring long life to the cutters and long use before needing any sharpening. The oil circulated goes over these cutters at the rate of about one and a half gallons per minute, and the free opening in the pan allows the oil and cuttings to return to a filtering tank, made by a series of pans set one on top of the other, which are of good size to allow the oil to move slowly and the cuttings to settle to the bottom of the pan. These pans are made with an opening on the side to allow the oil to fall to the one below, having an edge or partition over which the oil flows into the pan below, and there flows to the opposite side to a similar opening to the pan below that; thus, by running over four or five pans, it becomes thoroughly filtered and runs into the large tank below the pans, and thus avoids all trouble from clogging the little jets at the milling cutters.

The oil can be used and re-used for a long time, and no loss occurs, except what little may be carried with each piece of work when taken out, and which is quickly removed from the work by putting into fine sawdust.

A fender is suspended over the mills where the oil strikes them, to prevent the oil from splashing over the edge of the pan containing the jig.

In the work I do, fourteen (14) cutters are used, each cutting $\frac{1}{8}''$ wide and $\frac{3}{16}''$ deep, cutting machinery steel. The length of cut is about $4\frac{1}{2}''$, and with the above process and the convenient jig for chucking the pieces I use, I do the above work of milling grooves in from eight to nine minutes, including the chucking and removing from the jig; in other words, by steady attention to the work they can be milled in about nine to ten minutes on an average, without any hurry on the part of the operator. Thus it will be seen that economy is gained by this process, especially where a large number of a similar article is made.

The gang, after making about 75 cuts, showed no perceptible wear.

A cooling device can be made to great advantage in the oil tank, by means of a coil of pipe through which cold water should flow, thus carrying away the heat from the oil and making it an effectual cooler to the cutters. But if the body of oil is large enough, and the length of time the milling is done not too long, this is not absolutely necessary. Soda water can also be used with good results, instead of the oil, but oil being a better lubricator it is more satisfactory, and less risk is incurred.

A. B. Landis.

Squaring Mixed Numbers.

Editor American Machinist:

Mr. Hunsberger's remarks on page 5 of last week's American Machinist brings to mind another little trick with mixed numbers.

If we want to square $5\frac{1}{2}$, we generally reduce to improper fraction, $\frac{11}{2}$; then $\frac{11}{2}\times\frac{11}{2}=\frac{121}{4}=30\frac{1}{4}$. By our method, we will take the two whole numbers nearest to $5\frac{1}{2}$, which are 5 and 6. Now $5\times6=30$, and if we add the square of $\frac{1}{2}$, which is $\frac{1}{4}$, we get $30\frac{1}{4}$, the answer. No matter what numbers you choose, the answer will be correct every time. James F. Hobart.

Making Tarred Rope.

Editor American Machinist:

I presume F. I., La Crosse, Wis., wants to know how to make tarred string. Allow me to say what little I know about it. In passing through a rope-walk once, where they made tarred rope for rigging of vessels, I observed they used ordinary material to make it. After it was twisted it was placed in a cauldron of hot tar, known as Stockholm tar in England, and allowed to remain long enough to be well saturated, then one end was passed through a hole in a board and fastened to a capstan, which, being revolved, draws it from the cauldron, and, passing through the hole above referred to, takes off the superfluous tar, which returns to the bulk. The rope remains on the drum until dry enough to handle.

W. Newton.

Smoke Prevention.

Editor American Machinist:

We have recently tried a little experiment, and made a discovery which we are willing to give away, if it will be of any benefit to the readers of the American Machinist.

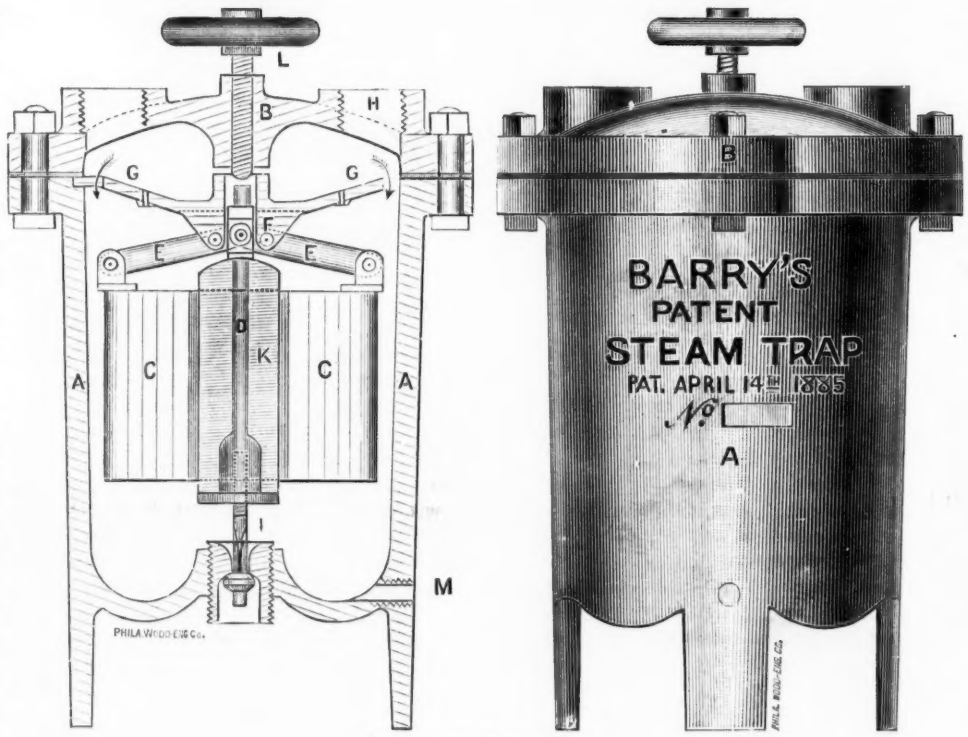
We have a grate surface under our boiler of 17 square feet; ordinarily we have to force the fire hard to make enough steam; consequently, we made a large quantity of dense black smoke that went just where it had a mind to after it got to the top of the chimney. This caused the health commissioner to send frequent delegations around to interview us, and the result was occasional fines for violating the smoke ordinance. In order to avoid the fines, we made a set of grates to burn hard-coal screenings, and connected a small pressure-blower to the ashpit by an eight-inch pipe, and closed up the ashpit doors and went ahead with the hard-coal slack or screenings, which cost us, delivered, $1 per ton. This works elegant, and to our surprise we can burn soft or bituminous coal (either lump or slack) without making any smoke.

This latter part of it is what was to us a discovery. We knew the hard coal screenings would not make any smoke, but why does not the soft coal make smoke when we blow the air under the grates by means of a pressure-blower, just the same as though we allowed the natural draft of the chimney to furnish the necessary air? We get a stronger air pressure with the blower than the chimney would furnish, and thereby form a more perfect combustion of the solid and gaseous matter contained in the coal. This is the only solution of the problem I am able to offer at present. I would like to hear from some one who has had experience in this direction. J. S. Wilson.

Chicago, Ill.

The Barry Automatic Steam Trap.

This trap is automatic and positive in its operations, and appears to have no parts liable to get out of order. It will work under any amount of back pressure, and deliver the water of condensation to any point desired above the level of the trap. It is sensitive and will operate at from one-half ounce pressure per square to one hundred pounds, or more; no steam can escape at the discharge valve.



Automatic Steam Trap.

In the detail engraving *A* is a cast-iron cylindrical case with top *B* bolted to it. *C* is an annular cup, hinged to levers *E E* which are pivoted to ears projecting downward from a deflector *G*, and is one-fourth inch smaller than the case *A*. The water of condensation enters the trap at *H*. *K* is a counterbalance with valve stem *I*, screwed in lower end. Their combined weight just balances that of the empty cup *C*. The leverage in *G G* being four to one the weight of *K* is just four times as heavy as the empty cup *C*. The discharge valve *I* varies in size of opening according to size of trap.

When the cup *C* is full of water the valve *I* is kept to its seat by a force that 100 pounds pressure per square inch will not overcome, if the water in the case is below the bottom of the cup *C*, but as the water rises in the case *A*, the weight of the water in the cup *C* is lessened in proportion to the height of the water in case *A*, and when the water reaches the level of the top of the cup, the water in the cup is just balanced by the water outside, then there will be no force acting to hold the valve *I* to its seat, and if the water now rises but one-half inch above the top of the cup, its weight or pressure on the valve *I* will be sufficient to open it, or less than one ounce of steam pressure per square inch will produce the same result.

When the valve *I* is opened the water in the case *A* will fall to a point at which the weight of the water in the cup *C* just balances the pressure that may be in the trap, whether it be one pound or one hundred pounds per square inch, and then the water will continue to flow out in a continuous stream as fast as it flows in. When the water ceases to flow in the case *A*, its level is lowered to a point where the cup *C* exerts a force by its weight and closes the valve *I*, and, as the weight of the water in the cup *C* is always at least twenty-five per cent. in excess of any possible pressure that can be in the trap, there will always be an effectual seal of water to prevent the escape of steam.

A. J. Koch & Co., 217 Race street, Philadelphia, are the manufacturers.

The saw mill-owners of Michigan are evading the ten-hour law that recently went into effect in that State by making contracts with their workmen for more hours per day. Both parties are foolish. The law has been shown to be a wise one wherever in operation.

Power Pipe-Cutting and Threading Machine.

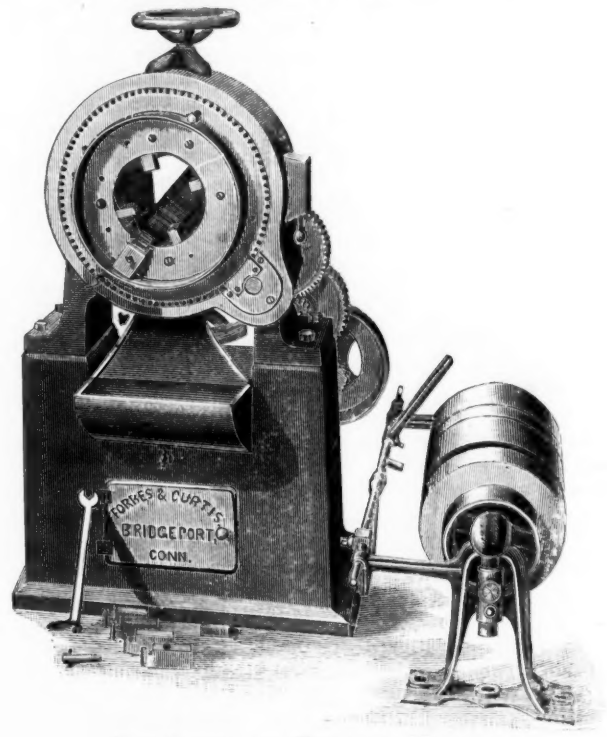
The engraving represents a new machine for cutting and threading pipe, made by Forbes & Curtis, 98 John street, New York; factory Bridgeport, Conn.

The bits or dies are four in number, and carried by a powerful gear, which is furnished with a lead-screw at its back. These bits are worked forward or back by the throw of a cam-ring, which is operated by means of a lever, allowing an adjustment for variations in size of fittings. One set of bits threads all sizes of pipe from 2½ to 4 inches, and the second set from 4½ to 6 inches. The lead-screw is engaged with two large lead-screw blocks, one of which can be seen at right of cut, about the middle of the shell. By means of handles, these blocks are thrown out of gear when the thread is cut, and on opening the dies, the gear can be at once drawn forward, and the dies closed ready for another pipe.

In cutting-off, the gear is sent as far back as possible into the shell, and held there by means of a pin (not shown in cut) the lead-blocks of course being thrown out. The cut-off is actuated by a worm and wheel which gives a steady powerful feed.

The vise jaws are 12 inches in length, and of a strength much beyond the requirements. The gearing is 2¼ inch face; the driving cones have two changes of speed, 3 inch face.

The counter-shaft is arranged for open and cross belts; allowing a few turns backward to be made before loosening the pipe.



PIPE-CUTTING AND THREADING MACHINE.

Labor in Europe Contrasted with American Labor.

Consul General Weaver, at Vienna, Austria, says:

"The difference in the cost of the necessaries of life—food, for example—in Austria when compared with that in the United States, is not very great, but when the mode of living is taken into account the difference becomes very striking. Flour, meat and vegetables generally cost more in Austria than in the United States, particularly the flour and meat, as these articles can almost be imported from the United States to this country with profit. House rent is approximately as high as in the United States; but in the article of clothing the difference is largely in favor of this country, being about the only article of prime necessity to the laboring man which can be purchased at less cost in Austria than in the United States. But when we come to consider the mode of life practiced here by the laboring man the contrast is very great. Food and clothing are limited to a minimum, both in quantity, and quality, the former consisting generally of rye bread with figs, coffee and soup, or meat with vegetables not more than once a day, in many cases only once a week, while the clothing is coarse and durable. Were it otherwise the small pittance earned would not suffice, even with the greatest economy."

Consul Cathin, at Stuttgart, Germany, says:

"The quarters of the working people in this city are, as a general thing, better, I think, than those occupied by the similar class of population in New York, and they are constantly improving."

Consul Mason, at Marseilles, France, says:

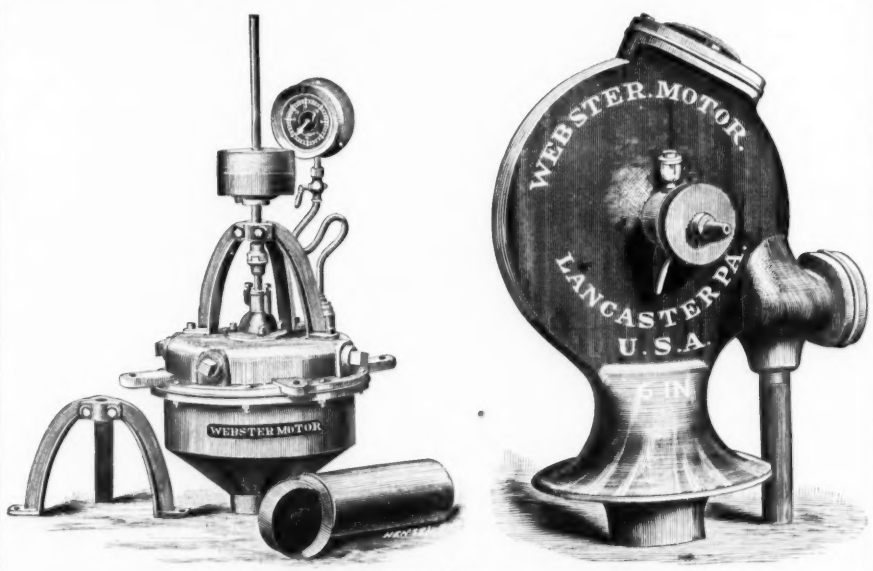
"In a general sense the care and consideration of employers for the lives and safety of their employes are much greater here than in the United States. Fatal accidents from fires, the bursting of boilers, railway accidents, etc., are so rare as to be hardly worth considering. The law holds an employer responsble for the lives and safety of his employes, and his personal interests, if no higher motive, constrain him to impose no unnecessary risks. The solid, permanent, fireproof buildings, floored and roofed with tiles, and provided with stone stairways, present no opportunity for sudden fires. The very scarcity of timber precludes inflammable buildings and makes life and property nearly secure from fire."

Consul Schenck, at Barcelona, Spain, says:

"The co-operative societies of production are much less numerous than those of consumption, owing to the necessity of more ability in the directors, and a special spirit of laboriousness and discipline in the members. Nevertheless, some have prospered, while others lead a pretty easy existence.

"At present the following more or less important ones exist: In Barcelona, mechanical cotton weavers, carpenters, cabinet makers, and masons; in Gracia, boiler-makers; in Badalona rope-makers and hand cotton weavers; in Roda, mechanical cotton weavers; in Teya, mechanical cotton weavers; in Villanueva y Geltin, coopers; in Canet, hand cotton weavers; in Palafurgell, cork-makers; in Mataro, masons and mechanical cotton weavers."

When a machinery manufacturer who has been successful in that line, and has accumulate a snug sum of money, wants a hobby to divert himself from the routine of business, he does not found an art gallery to be filled with costly paintings or set up bronze statues in city parks. He does nothing of the kind. Being possessed of original progressive and utilitarian views, he straightway starts a newspaper. Of course the venture regularly absorbs all the spare cash he cares to bestow from philanthropic motives, but the "plant" usually grows and so does the hope of ultimate success in working up a revenue equal to or greater than the expenditures. Generally, however, the growth is limited, but it would be too much humbling of generous pride to let the public know much about its decline. The gratification may be worth all it costs. Examples may be found both east and west. In Ohio a wealthy machinery man ran a mechanical paper for some years and then moved it to New York. He occasionally varies his diversion by running for office. In Massachusetts a machinery manufacturer of large means has sunk what by ordinary men would be considered a nice snug fortune in a mechanical paper, but if he likes the amusement it is nobody else's business. In this city a man in the machinery interest ran a paper to advocate the principles of a new political party for a few years, but has lately tied his purse strings a little closer, and resigned the venture to others. In New Jersey a man successful in the machinery line is publishing a religious newspaper which probably does not absorb as much cash as one of the mechanical kind. In Pennsylvania a well-to-do machinery manufacturer had several years' experience in running a daily paper with a balance on the wrong side of the ledger, until a "consolidation" was made. Types and presses seem to have a greater charm for a machinery man with a large bank account, before he has tried to manage them, than after he has been tied to the same a few years.



WATER MOTORS.

The Webster Water Motors.

Among the advantages possessed by these motors, are compactness in construction, direct application of power, positive motion, and economy of water. They are an American aplication of an English idea. For driving light machinery, these motors form a very economical power. They are made both high and low-pressure, and work from 8 lbs. per square inch upwards.

The high-pressure motor wheel works much like a small overshot wheel in a vertical case, but uses pressure of the water, as well as its weight. The low pressure motor is built horizontal, and partakes somewhat of the nature of a turbine.

The manufacturers are D. Walter Webster & Co., Lancaster, Pa.

Shop Notes.

Have you got belt-shifters on the lathes in your shop? Can you run the belt off the spindle-pulley, and then guide it upon the big step of an overhead pulley, with a neat little gas-pipe rig?

Can you do this; or must your men juggle the belt up there by sleight-of-hand, or coax it up with a shaft measuring stick, or a ten-foot pole?

That belt is very greasy; it will not catch on that smooth pulley; you get desperate, give a big lift with your pole and the belt catches, but it takes the pole with it, and your oil can, and your hat and spectacles, and the gas fixtures, and wipes them all up.

This business is all nonsense. Get enough 1″ steam pipe to reach from the floor above to your floor, or to a nice step attached to the lathe bed. Set it to line with the middle step of the overhead pulley, and about 12″ from it.

Put a tee in the pipe, just below the lower side of the pulley. Screw an 8″ or 10″ pipe into the tee. Now make a stirrup belt shifter, just like the one on that screw planer. Make the shank to slide in the short piece of pipe, and of the same length. Put up a couple of stops, or nail up two pieces of board to the floor joist, so that the belt arm cannot turn far enough to throw beyond the big or small step. Clamp on a handle, or make one with another tee and long nipple, placed where convenient to get hold of.

Put the belt through that stirrup guide, and you can shift your belt ten times while your neighbor is hunting up a greasy pole.

Have you got any overhead traveling works in your shop? Do you lug big castings from the foundry to the lathe, from lathe to planer, and so on?

Do you have a big truck with a track under it, and old junk always in the way on the track? Perhaps you have got two or three big cranes which will reach each other, and everywhere else, except just where you want them to.

Why don't you put in a single overhead track of $5x\frac{3}{4}$″ iron set up edgewise? Hang a set of differential pulleys thereon, by a flanged pulley, and you will save many an hour.

Larger engines, faster time and longer runs are the order in England as well as in this country. The North-Eastern Railway Company is having twenty new engines built solely for express service, which, in several respects, will be unequaled in the world. These are some of the characteristics: drivers—four wheels coupled—7 feet 2 inches in diameter; leading wheels, 4 feet 6 inches in diameter; wheel base, 16 feet 8 inches; cylinders, 18 by 24 inches; capacity of tender, 2,800 gallons of water and 3 tons of coal; weight of engine, with steam up, 42 tons, weight of tender, 28 tons, total, 70 tons. These engines will each be capable of running express from York to Edinburgh in one journey, thus doubling the length of run, two now being required. As for their speed, it is stated that on a trial trip one already built made the extraordinary time of eighty miles per hour. However, if American engines with drivers 5 feet 8 inches in diameter can make 72.6 miles per hour for 36 miles, as was recently done on the West Shore Road, we can believe that wheels 18 inches larger can run still faster.—*Railway Age.*

A correspondent writes us pointing out an error in the example illustrating the use of the formula for the thickness of cylinders, as given by Wm. T. Silver in our issue of September 26th. The result should have been given as about $1\frac{3}{4}$ inch instead of a little more than an inch. The formula quoted by Mr. Silver would not be correct, or according to practice, for pressures as high as 120 lbs. For a pressure of 80 lbs. it would be nearer to practice in stationary engines.

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NEW YORK, OCTOBER 17, 1885.

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Progress in Improved Shop Tools.

Quite a number of machine shop owners, while ostensibly recognizing the value of solid improvements being made in shop tools, do not become impressed with their real merits as aids to competition until they find themselves outdone by rivals in business. The discovery, when made in this way, is anything but pleasing, but it is likely to lead, however late, to a searching investigation into recent developments in tools and processes for doing work. The shop owner who makes a regular study of current progress in tools, both small and large, with an eye to turning out the best work at the lowest possible cost, never finds himself in such a predicament as above indicated. He always has an advantage over his neighbor, who thinks that no very important improvements can be made in the regular equipment of an ordinary shop, and that it is not worth his time and attention to study into what is being done in that line.

It takes but a very few years for the unprogressive shop owner to get so far behind in facilities for turning out work rapidly and accurately, that he finds it next to impossible to catch up.

Within a few months, comparatively speaking, marked improvements have been made, among other things, in gear-cutting machines, tool-grinding machines, drilling machines, shaping machines, power hammers, brass working lathes, bolt-cutters, emery grinding machines, punching and shearing machines, special milling machines, screw-cutting machines and a variety of small shop tools. The improvements are in the direction of enabling good work to be turned out at lower cost. We do not assume that every claimed improvement is a real one. Users of machinery who keep informed of noteworthy changes, can weigh the probable advantages of whatever new devices are offered. In the columns of the AMERICAN MACHINIST from week to week may be found descriptions of what has come to the front in the line of improved machines and tools, and it hardly requires the practiced eye of an expert to see that a large amount of very careful thought by men experienced in the use of machines and tools is being directed to the new forms presented to the mechanical public. Since the general machine business has been dull and competition sharp, much study has been expended upon improvements, and whether the user of machinery is ready at once to adopt some of them or, by logic of circumstances, must defer it for a season, he cannot afford to pass them by without close examination, with a view to action sooner or later.

Encouragement to Manufacturers Worth More than Natural Advantages.

There are many small towns that would like to have manufactories to increase their population and business, but whose citizens think it of little use to try to attract them, because of the lack of natural advantages. The possession of a water-power or a coal mine in the immediate vicinity, is considered by many a huge loadstone to draw manufacturers to the spot. There is a great deal of delusion in this view. The owners of a water-power are apt to charge a good rent for its use, and coal-mine owners get as high prices for their fuel as possible.

It is the enterprise of the people of a town in extending direct inducements to new manufactories that brings them to the town, and increases its wealth and population more than all natural advantages. Of course the manufacture of salt, bricks, pottery and certain other articles must be carried on where the materials are convenient, but most kinds of manufactured goods can be made in one place as well as another. Has any one ever discovered what natural advantages Troy has for making making stoves, collars and cuffs, or Waterbury for rolling brass and copper, or Worcester for building machine tools, or Paterson for weaving silk, or Lynn for making boots and shoes, or Philadelphia for weaving carpets, or Westfield for making whips, or Attleboro for making jewelry, or New Haven for making carriages, or Wheeling for making nails, or Danbury for making hats, or Meriden for making silver-plated ware, or Gloversville for making gloves, or New Britain for making builders' hardware, or Fall River for weaving cotton fabrics, or Taunton for making tacks, or Gardner for making chairs?

Great industries are built up by enterprise on the part of their promoters, and substantial encouragement on the part of citizens where they locate. With fair facilities for transportation, and without overburdensome taxation, any town can attract manufacturers if the citizens will act together with spirit and determination.

The Natural Gas Problems.

Petroleum is transported hundreds of miles in pipes. How far can natural gas be profitably carried? If the supply of gas holds out and proves sufficient to considerably more than meet the manufacturing wants of the localities producing it, the natural gas companies will have the opportunity to choose between two or three courses of action. One will be to sell their product at home, at rates which will not greatly cut under the cost of coal. This will tend to deprive the natural gas-producing localities of any special advantages over the other manufacturing centers. Another course they may adopt, is to sell at home, at prices which offer users special advantages, and wait for these advantages to build up the localities enjoying them, to the point where the full supply of natural gas can be utilized. A third course is to consider the practicability of conveying the gas from the localities where it is produced, to manufacturing centers where it may be consumed.

Breaking the Law Against Prison Contracts.

The contest between free manufacturing industries and prison contract labor must eventually be settled in this country by the abolition of the latter. In spite of persistent struggles to maintain the plan of jobbing out the labor of convicts to private contractors, which is making a select few wealthy at the expense of the many, the people's decision that a change must be made in the prison labor system will be carried out. If one set of representatives elected by the people will not carry out their expressed wishes in this respect, some other set will be chosen that will be pledged to do it. The contest is fast coming to a crisis in the State of New York, and the peculiar contortions of the contract ring are getting to be amusing. Not stopping at false statements of prison profits they have prevailed upon certain prison officials to make contracts for the labor of convicts contrary to law, but in such a way as to hope that the evasion would be sustained by those in higher authority.

The Legislature having appropriated money to build an addition to the Elmira Reformatory, the job was let to contractors who made arrangements with the prison authorities to have the labor of convicts on the work at 75 cts. a day. Governor Hill, after investigating the case, ordered the stoppage of such employment. He says:

The statute forbids the making of any contracts whatever for the employment of convicts. This includes contracts both expressed and implied, written or oral. The statute was enacted for the purpose of preventing the labor of convicts being brought into competition with honest outside labor. Its wisdom is not to be questioned. So long as it remains upon the statute books it must be strictly and in good faith enforced. The peculiar arrangement which it is stated has been entered into with the contractors, by which a considerable number of prisoners are to be employed generally upon the work, and, at its completion, an adjustment is to be made whereby the State is to be credited for whatever labor it has furnished to the contractors, and they are to be allowed for whatever extra work they may do, and then a balance is to be struck and the difference paid, must be regarded as an ingenious contrivance, the legitimate effect of which, however, is to nullify the law. If such an arrangement is authorized, it follows that convicts can be let out to contractors upon public works of the State, and their labor be brought into direct competition with outside labor to any extent that may be desired, and there would be no remedy.

As we have always contended, prisoners ought to be employed upon the public works of the State or county. There is no need of the intervention of contractors to pocket the profits of their labor. Roads, buildings, canals and other State properties would furnish employment to all convicts now employed upon contracts, and the products of their labor would not come into competition with free industries.

The Mechanical Part of the Political Campaign.

Regardless of all the talk about the machine and machine methods in politics, there is very little that can be called mechanical in the usual political campaigns. Mechanical engineers, as a rule, don't devote much energy to politics, and the average political leader knows little and cares less about mechanical engineering. But as the political fray grows hotter, and the "combat deepens" this year, it has been discovered that the mechanical engineer can prove a valuable factor in the contest. Since it has been decided to lug in the Dolphin as one of the "issues," some knowledge of mechanical construction is indispensable to the orator who expects to electrify his audience with an intelligent presentation of the questions in dispute. He can soar up into the silver cloud (with a golden lining), and talk tariff from every point of the compass without searching far for his facts (or fancies), but when he comes to the Dolphin, unless he has been specially "stuffed" with mechanical information, the probabilities are that the opposition press (after consulting a mechanical engineer) will pick that part of his speech into fine pieces, and subject him to ridicule. Let no political orator or political editor essay to discuss the whole range of "issues" in this campaign without first taking a few lessons from a mechanical engineer in the alignment of engines in steam vessels, power and weight of engines compared with size and strength of vessel, heating of crank-pins and proper lubrication, vibration of steam vessels at different speeds, and strength of braces and riveted joints. Then, after studying the official report on the trials of the Dolphin, he should be ready to tackle the "issue" with credit to himself and to his party.

Book-keeping in Small Shops.

In very many small shops and some large ones the value of an accurate and handy system of book-keeping, while a matter of daily illustration, receives scant appreciation. In this respect, the business end of the machine trade does not greatly differ from the business end of any other occupation.

The farmer who keeps no books, and rotates his crops from year to year, with no means of knowing definitely just how his various fields and crops are doing, may be a practical farmer, but it is a chance whether the same amount of practice, carried on under more intelligent methods, would not pay better. In like manner, the merchant who does his book-keeping on loose slips, or contents himself with jotting down debits in a crude fashion by single entry, is liable to find, after a term of years of such "business," that he has failed to take note of a host of small expenses; that he has unduly magnified in his imagination the results of his trading in certain lines of goods, and underestimated others; while his supposed surplus is largely represented by assets the reverse of tangible.

Just so many practical mechanics start out for themselves in running a shop, without fully realizing that to conserve is quite as important as to create. Such a shop may do a special job, for example, and, if no properly-itemized account is kept, a few months later such a job, if undertaken, is substantially a new one on which no data as to cost are at hand. Many a shop has found special data of this kind growing out of a long-past piece of job work a very valuable part of its stock-in-trade.

But it is to the absence of properly arranged stock and cost accounts, that a shop which keeps no books, or poor ones, can trace hindrances not less serious. Such shops have no correct means of estimating the varied lines of expenses which belong to the shop in general, and which can only be divided among particular jobs or lots of goods, as their amount is correctly computed. If the attempt is made to allow for these by guess, fixing the percentage too high tends to scare away business. Fixing it too low hurts the shop.

Neglecting the actual business of a shop for the sake of indulging in a superfine variety of book-keeping is not by any means a necessary alternative. The point is that next in importance to doing good work, is keeping an accurate account of it.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(287) **E. K., Troy, N. Y., asks:** What would be the maximum speed for a gear wheel five feet diameter, 1¾″ pitch, of cast iron? *A.*—There is hardly a limit to the speed at which properly constructed gearing can be run, until the limit at which the centrifugal force is dangerous is reached.

(288) **W. W., Pottsville, Pa., asks:** What is a right and what a left-hand engine? *A.*—Stand at the end of the cylinder of a horizontal engine, facing the shaft. In a right-hand engine the outboard pillow-block and driving-pulley will be to the right, in a left-hand to the left.

(289) **A. R., Bay Springs, Mich., writes:** I have a boiler 24″ diameter and 6 feet long, with cast-iron heads one inch thick. Will 1″ and 1⅛″ wrought-iron flues expanded in these heads be a success? *A.*—So far as the tubes are concerned, there will be no trouble in expanding them tight in cast iron.

(290) **F. F. Y., ——, asks:** 1. What would be the power of an upright engine 2″×5½″, 50 lbs. boiler pressure, 400 revolutions? *A.*—From ½ to ¾ horse-power. 2. Would a boiler 18″ diameter, 3½ feet high, with a 12″ flue in center, develop 2 horse-power? *A.*—No; probably less than half of it. 3. Would such a boiler and engine run three or four 10″ foot-lathes, drilling holes from ⅛″ to ⅝″ diameter? *A.*—They would probably do the work.

(291) **H. D., Matteawan, N.Y., asks:** Will you give me a rule for finding how much water a tank 8 feet diameter and 10 feet deep will hold? *A.* Find the contents of the tank in cubic inches; this, divided by 231, the cubic inches in a gallon, will give the number of gallons. In this instance the area, in inches, of the tank is 7238.24, and the depth 120 inches. 7238.24 × 120 = 868588.8 cubic inches in the tank, which, divided by 231, gives 3760, the capacity in gallons.

(292) **J. N. S., Scranton, Pa., asks:** Will you tell me the per cent., of ash and clinker that should remain from first-class Scranton and Pittston coal; also any standard authority on the subject? *A.*—We should consider that, for good coal, the percentage of incombustible matter remaining should not exceed 10 per cent. This is based upon the results of tests actually made. You will find in the "Combustion of Coal," by Barr, matter relating to this.

(293) **C. E. B., Philadelphia, Pa., writes:** I have a pulley 3 feet diameter on the line shaft, and 2 feet on a machine. The machine is stalled by heavy work. Can I make it go by reducing the size of pulley on line shaft? *A.*—Reducing the size of pulley on line shaft will speed the machine slower, but will also reduce the belt speed, so that the only gain in driving the machine at all would be from the fact that the driving would be a little stronger by having the two pulleys of the same size. This could, probably, be more satisfactorily accomplished by increasing the size of the pulley on the machine. By increasing the size of both pulleys you would drive stronger at the present speed, because you would then increase the belt speed. This would keep the speed as at present. 2. Is there any table of approximate pressure per square inch of belts on pulleys, under average conditions? *A.*—You will find in books treating of belts data that will enable you to make such a table. 3. In making a cutter to cut mouldings in marble, the cutter to be 2¼ inches wide, would you consider it any advantage to make it of a bar the right width and thickness, so as to make the cutting edge at the end of the bar? *A.*—The only advantage we can see is that of convenience.

Business Specials

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

T. M. Parker, Steel Stamps, Stencils, Hart'f'd, Ct. J. Clayton, Air Compressors, Rock Drills 43 Dey st, NY

Edw. Sears, wood engraver, 48 Beekman st., N.Y.

Presses & Dies, Ferracute Mach. Co, Bridgeton, N J.

Steel Name Stamps, &c. J.B. Roney, Lynn, Mass.

Tack, wire, and shoe nail machinery; Wm. A. Sweetser, Brockton, Mass.

Treatise on gear teeth and bevel gears; specimen pp. free. Geo. B. Grant, 66 Beverly st., Boston, Mass

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts, New York.

Selden Packing for stuffing box, with or without rubber core Randolph Brandt, 38 Cortlandt st., N.Y.

Improved Labor-Saving Upright Drills; prices reasonable. Currier & Snyder, Worcester, Mass.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Foot-Power Machinery for workshop use, sent on trial if desired. W. F. & Jno. Barnes, Rockford, Ill.

Lyman's Gear Chart. How to lay out gear teeth. Price, 50c. E. Lyman, C. E., New Haven, Conn.

Upright power hammers, unequaled for die work run at high speed. Williams, White & Co., Moline, Ill

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John st., N. Y.

Curtis Pressure Regulators, Curtis Return Trap, Curtis Damper Regulator. See Oct. 10 p. 14. Send for circular No. 17, Curtis Reg. Co., Boston, Mass.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker st., Philadelphia, Pa.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 62 Chatham st., N. Y.

Files recut without drawing temper, about one-half usual prices; samples recut free; prices on application. The Acme Co, Collinsville, Conn.

The outline ("wax process") engravings shown in the Am. Machinist each week are made by Struthers, Servoss & Co., 24 to 34 New Chambers St., N.Y.

"Complete Practical Machinist," $2.50; "Mechanical Drawing Self-Taught;" $4. Books for workmen. Joshua Rose, Box 3306, New York City.

Morrison's Practical Engineer, a complete treatise on steam and general machinery. Price, $1; mailed free Indicators, Engineers' Instruments and outfits. W. A. Morrison, Box 373, Lowell, Mass.

Locomotive Engine Running and Management. By Angus Sinclair. Gives full directions about handling and repairing locomotives; instructs how to design valve gear and set valves; Westinghouse air brake explained by aid of engravings. Price, $2. For sale by *National Car Builder*, 187 Dearborn st., Chicago, Ill.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies.

Manufactures.

W. P. Floyd, Tavares, Fla., is building a machine shop.

Still & Brenagar, Overton, Texas, will move their foundry to Henderson.

The Cambria Iron Co, Johnstown, Pa., will erect an addition to their blooming mill.

Robert McKenzie, 18 S. Aubin ave., Detroit, Mich., will erect a brick boiler shop.

H. H. Reynolds and B. F. Hanes, Winston, N. C., will each erect a large tobacco factory.

Sam Ashbury, Charlotte, N. C., has leased a building which he will fit up as a machine shop.

Jas. Rowland, Kensington Iron and Steel Works Philadelphia, are running full time and plant.

The H. B. Smith Company, Westfield, Mass., is about to build an addition to its new foundry.

The Metropolitan Railroad Co., 16 Kilby street, Boston, will erect a repair shop, to cost $20,000.

F. W. Ahrens, Charlotte, N. C., will move his machine shops into a new building now being erected.

The big monitor Puritan, now being completed at Roach's shipyard, is soon to make a trial trip at sea.

It is said that the Chesapeake and Nashville Railroad Co, will erect machine shops at Nashville, Tenn.

Baugh & Sons, 20 S Delaware ave., Philadelphia, will erect a $20,000 addition to their fertilizing works.

It is said that Ernst Otz, Spring street, W. Hoboken, N. J., will immediately erect a large silk manufactory.

W. C. Kelly & Co., Louisville, Ky, will rebuild their axe and hatchet factory. Works to cost about $50,000.

Cotton mills are being built at Knoxville, Tenn., to cost $150,000. They are to be completed Jan. 1, 1886.—*Phila. Press.*

Steps have been taken by a number of Reading, Pa., capitalists to start up the old Union Foundry, in North Reading.

The Edison Electric Light Co., Dallas, Texas, have signed contract agreeing to erect a $150,000 plant in that city.

The employes in the Pennsylvania Railroad shops at Altoona, are working eight hours a day and five days a week.

G. W. Blabon & Co., 124 North 3d street, Philadelphia, will erect a $50,000 addition to their oil-cloth factory in Nicetown.

J. Mealey, of Philadelphia, will erect a 3-story carpet and rug factory on Amber street, near Westmoreland, to cost $10,000.

The W. A. Hoeveler Co., glue and curled hair, Pittsburgh, Pa., will at once erect an addition to their extensive plant at Springdale.

Joseph Murphy will erect an elastic goods manufactory in Philadelphia, to cost $10,000. It will stand at 3d and Cumberland streets.

J. S Tomlison is arranging plant for the railroad shops of the Queen & Crescent Railroad, of Chattanooga, Tenn. Estimated cost, $75,000.

The revenue steamer Crawford is to be repaired by the Columbian Iron Works and Dry Dock Co., Baltimore, Md. The cost is to be $17,200.

The Jacksonville, Tampa & Key West Railroad will erect shops at Palatka, Fla., for 250 miles of road. The machinery has been purchased.

The Pittsburgh Locomotive and Car Works, Pittsburgh, Pa., are about to erect an addition to their works on Beaver ave., Allegheny City, Pa.

W. P. Davis, North Bloomfield, N. Y., writes us: We are having a good sale on 26″ drilling machines, and are behind orders; also on apple grinders.

King & Co., Huntingdon, W. Va., have leased ground in Winchester, Clark Co., Ky, on which to erect a large iron foundry and machine shops.

Thomas Nichols, Fifth ave. and Fifth street, Newark, N. J., will erect a three-story brick hat factory; also an engine and boiler-house and dye-house.

The Pennsylvania Manufacturing, Mining and Supply Company, of Pittsburgh, Pa, will at once erect terra-cotta works. Estimated cost, $15,000.

Frederick Rumpf & Bros., Huntington and Hancock streets, Philadelphia, will erect a $40 000 factory building. It will be 40×195 feet, three stories high

The Globe Woolen Company, Utica, N. Y., has broken ground for the erection of a worsted mill, which will furnish employment for about 200 hands.

The Arrott Steam-Power Mill Co., Philadelphia, will erect a five-story building, 40×195 feet, for general manufacturing purposes. It will cost $34,000.

The Cushman Chuck Company, Hartford, Conn., formerly doing business as Austin F. Cushman, has been incorporated to manufacture chucks. Capital stock, $80,000.

James G. Beales, proprietor of the West Penn Steel Works, Leechburg, Pa., will erect a large finishing department to his works. Work to commence at once.

An electrical device records each revolution of the Buckeye engines which are running at the Novelties Exhibition. It is applied in office or home of owner, as desired.

The Grand Rapids Furniture Company's factory, J. C. More, president, Grand Rapids, Mich., has been damaged by fire to the extent of $10,000. Will rebuild immediately.

It is reported that the Fall Brook Coal Company, Wellsboro, Pa., has bought the Bayer tannery in Brooklyn, with land adjoining, and will erect machine shops thereon.

The John Stephenson Co., 27th street, near 4th avenue, New York, have the largest street-car factory in the world, but will erect two brick extensions, and make other improvements.

The Springfield Glue & Emery Wheel Company, Springfield, Mass, inform us that they are pleased to send out their tool-grinders on 30 days' trial, to be returned if not entirely satisfactory.

Proposals are invited for furnishing the city of Montgomery, Ala, with water, in volume not less than 6,000,000 gallons per diem. W. S. Reese, Mayor; T. H. Carr, J. W. Hale, T. J. Williams, Committee on Public Works.

The business men of Blair, Neb., are organizing a stock company with a capital of $30,000, to be called the Blair Improvement Company. The location of stove works at that point appears to be the object of the association.

Hine & Robertson, 12 Cortlandt street, New York, accepting the terms for a reward of $100 for a perfect damper regulator offered by a Pennsylvania firm, put in the Kellam damper regulator, and secured the reward.

Trump Bros., Wilmington, Del., are supplying to the trade hexagon nuts, U. S standard, made by special machinery, by which it is claimed that the sides and angles are made to standard within 1-1000 inch, and the face square with thread. Nuts are furnished either case-hardened or soft.

According to the Lewiston (Me.) *Journal*, the woolen business is extraordinarily good in Lewiston just now, with prospects good in every way.

The tack factory at Florence, Mass., the Nonotuck Silk Company, the brass shop at Haydenville, James' woolen mill at Williamsburg, and the mills in Northampton generally report a considerable revival of trade, and some of them are crowded to fill orders.

Ground has been broken by the Valley Falls Co., Providence, R. I., manufacturers of cotton goods, for a new mill, to be erected on the Lincoln side. The mill will be 120x60 feet, 3 stories high, with all modern improvements. About 150 more hands will be employed.

The Amoskeag Company, Manchester, N. H., are to build a new mill 500 feet long, 100 feet wide, four stories high, and will employ 600 hands. The building will cost from $600,000 to $700,000, and will be used for the manufacture of yarn, cotton flannels, and ticking.

The Columbia Iron and Steel Co., of Pittsburgh, Pa., will soon erect large works to manufacture building fronts of steel, and other specialties. A. M. Beyers, Water street, Pittsburgh, and James Callery, President P. & W. R. R., Pittsburgh, are parties interested.

The trustees of the Somerworth Machine Company, Dover, N H., noticed in our last issue, are Mayor Ross, James E Lathrop, and B. F. Nealley. They will purchase land and give deeds to the machine company, who will begin the erection of buildings at once.

James Sheriffs (Vulcan Iron Works), 126 to 130 Barclay street, Milwaukee, Wis, has issued a neat illustrated catalogue and price-list describing marine engines, boilers, fire-fronts, bridge-builders' and boilermakers' punches and shears, with a variety of other specialties, including elevators.

The New England Manufacturing Company, Rockville, Conn., has decided to erect a new mill, 147x40, and five stories high, with a storehouse 60 ft. long and 30 feet wide, two stories high. Work will at once be commenced on these new buildings, and be pushed forward as rapidly as possible.

The Nicholson File Company, of Providence, R. I., have just started a battery of 250 H. P. of Harrison safety boilers, and the Barnard Mfg. Co., of Fall River, Mass., who put in 200 H. P. of these boilers about a year ago, are now adding 600 H. P. of the same kind, to replace old boilers.

The E. Horton & Son Co., of Windsor Locks, Conn, have received an order for a chuck which will be, when made, the largest in the world. It will be used for holding large engine driving wheels, and will be made according to patents lately issued, with two complete sets of gearing and six jaws.

One good effect of the stoppage of prison contracting in the State of New York is observable in the case of Sheldon & Co, who made wagon axles and other wagon hardware by convict labor in the Auburn prison. They will establish their axle works at Wilkesbarre, Pa., and employ from 250 to 500 free citizens.

The Midnight Yarn Co., of Philadelphia, is not, as some might suppose, an association to meet while others sleep and tell salty stories around a big bowl of punch. It is a company which will build a manufactory for yarns, on Canal street, between George and Third. It will be of brick, four stories high, and will cost about $30,000.

The Lake City Tool Company, of Madison, Wis., has increased its capital stock from $20,000 to $50,000, and is erecting shops of the following dimensions: Machine shop, 44x96; foundry, 40x70; boiler and engine house, 30x30; wood-working shop, 44x96; blacksmith shop, 25x40, and paint shop, 30x60, all but the last mentioned to be of stone.

The *Industrial World* says: "The Novelty Woolen Works have just broken ground at Western Springs, Ill., for a brick factory 100x60 feet in size and two stories high, with an addition 40x60 feet in size and two stories high, to be devoted to the manufacture of fleece lined knit goods, from which shoes, mitts, underwear, cardigan jackets, caps, hoods, etc., are to be made. The machinery for the manufacture of these goods is exclusively the property of the company, being patented. From $10,000 to $20,000 worth of this machinery will be placed in the works, and the company will employ, when in active operation, from 75 to 200 hands. The entire factory will be heated by steam. The officers of the company are Warren B. Wilson, president; Isidor Jaros, secretary and treasurer. Capital stock, $50,000. The works are expected to be completed Nov. 1."

J. S. Graham & Co., Rochester, N. Y., write us as follows: "Your last issue contains a clipping from an exchange stating that the undersigned were bringing out a very large timber planer, said to be the largest and heaviest built in the country, and weighing 9,000 pounds. In view of the fact that aside from this special machine we have three sizes of planing and matching machines that weigh from 9,000 to 12,500 pounds, to say nothing of those built by other firms, it is plainly seen that any 9,000-pound machine is very far from being the heaviest in the country. The mistake occurred through the hurry of a reporter of the paper in which it originally appeared, who was shown the machine in question, and evidently could not wait until he received a description of the machine, which was promised at an early day. The fact is, that the machine weighs over nine tons; or, to be exact, 19,000 pounds, finished weight."

King & Co., of Winchester, Ky., are erecting a machine shop there. They will put in necessary machinery to do all kinds of repairing and building with. They intend, as soon as possible, to put up a foundry.

The Leatherboard Company, at Saccarappa, Me., who sometime since reduced the wages of their employes ten per cent., have recently restored the old rates on account of increasing business and improved prospects.

The United States Twist Drill Co., Providence, R. I., write us: "We notice what is said in your issues of 12th and 19th of September regarding using and marking twist drills. We, in experimenting, have anticipated your correspondents by several months." Specimen drills sent us are cold-rolled to size by a new process; this leaves the fiber with the grooves substantially as if the steel were drawn, and the solid surface produced by the rolls intact; there is no grinding to size. The sizes are rolled in the groove near its termination, and hence will not be obliterated.

Machinists' Supplies and Iron.

New York, Oct. 1, 1885

There has been no material change in the supply trade or in manufacturing during the past week. Dealers feel confident, but expect a slow revival of business. Manufacturers are conservative in their ideas, and satisfied with anything that looks like an advance in the volume of business.

Iron—In American pig business is principally in small lots. There is at present among consumers an inclination to await further developments, rather than to buy stock ahead. In prices we quote Standard Lehigh brands at $18 to $18.50 for No. 1 X Foundry; No. 2 X Foundry, $16 to $16.50; Grey Forge, $13.50 to $14.50.

Scotch Pig—Only small transactions are reported in these brands. We quote Shotts, $19.50 to $20; Coltness, $19.50 to $20; Glengarnock, $18.50 to $19; Gartsherrie, $19 to $19.50; Summerlee, $19 to $19.50; Carnbroe, $18.50 to $19; Eglinton, $17.50 to $18; Langloan, $19.50; Dalmellington, $18 to $18.25.

Lead has ruled dull at 4¼c., but stock is steadily held. There is no probability of immediate improvement in prices.

Copper—The demand is moderate, but prices remain reasonably firm. Lake has sold at 11⅝c. to 11¾c.; other brands 10c. to 10⅝c.

Tin—The fluctuations in the London market have induced sellers here to hold more firmly to prices. Jobbing lots of Banca are quoted 20¾c.; Straits and Malacca, 20.90c.

Spelter—Refined, 4.75c. to 5c.

Antimony—Hallett's 8.70c.; Cookson's 9.70c.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Experienced draftsman wants situation; good references. Address D., care Am. Machinist.

Wanted—Situation as superintendent of iron foundry. Address Supt. Iron Foundry, Am. Machinist.

Mech. draftsman and patternmaker desires situation at either. Address H, Am. Machinist.

Wanted—Situation as foreman or supt. of machine shop; good recommendation as to character and ability. Box 568, Philadelphia, Pa.

By a practical boilermaker, situation as foreman. Thoroughly competent to perform any work in the shop or office, book-keeping excepted. Address Boilermaker, Am. Machinist.

A practical man desires situation as foreman of a boiler shop; has had experience in marine and stationary work of all kinds. Address "Tubal Cain," Am. Machinist.

Wanted.—A good draftsman with from $2,000 to $5,000 to take an interest in machine shop. Must be able to figure on and take contracts. Address "B," care of Savage & Farnum, Detroit, Mich.

Wanted.—Die maker who has had charge of a gang of men on square and irregular dies for tin, brass goods, etc. State age, experience and salary expected, with references. Ferracute Machine Co., Bridgeton, N. J.

Wanted—A practical machinist who has had experience in getting out duplicate work on a piecework system, and who understands the management of help; one having experience on agricultural machinery preferred. Address, with references, Minneapolis Harvester Works, Minneapolis, Minn.

✻ MISCELLANEOUS WANTS ✻

Advertisements will be inserted under this head at 35 cents per line, each insertion.

Crescent Boiler Compound; ever reliable, never failing. Crescent Mfg. Co., Cleveland, Ohio.

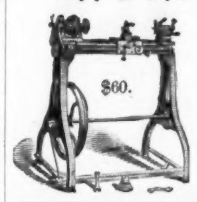
To make room for larger tool, will sell cheap, for cash, a planer 42"x42"x12', in good order. Address, P. O. Box 2085, Bridgeport, Conn.

Light machinery of all kinds built at short notice. Good workmanship guaranteed. Pennington & Mills, 8 Dey st., Jersey City Heights, N. J.

For Sale Cheap—One second-hand 18×36 Frick & Co. engine, in good condition. For particulars, apply to Ball Engine Co., Erie, Pa.

Cheap for Cash—A 60-inch Newton Half-Automatic Gear Cutter, used one year. Good as new. Also a few other Gear Cutters, Lathes, Planers and Drills. E. Gould & Eberhardt, Newark, N.J.

CHANDLER & FARQUHAR,
177 & 179 Washington St.,
BOSTON, MASS.



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—FOR—
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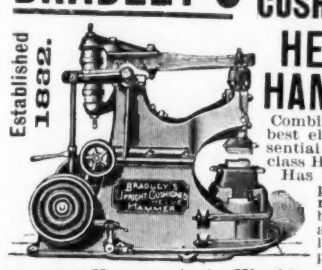
Send for Catalogue B.

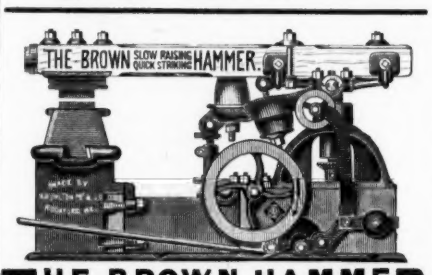
BRADLEY'S UPRIGHT CUSHIONED HELVE HAMMER



Combines all the best elements essential in a first-class Hammer. Has more good points, does more and better work and costs less for repairs than any other **Hammer** in the **World.**
BRADLEY & CO. Syracuse, N.Y.

STEPHENS PATENT VISES.

50 Per Cent. of time and labor saved by using this solid, strong, durable, quick-working Vise. Has the improved taper, pipe and other attachments. Sold by the trade. Send for circular.
MELVIN STEPHENS, Prop'r, Office, 41 Dey St., New York.



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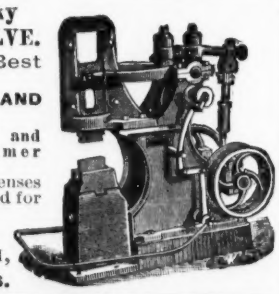
STRIKES A BLOW WITH
DOUBLE THE VELOCITY That it Raises the Hammer
A NEW MOVEMENT! SEND FOR DESCRIPTION
KNOWLTON MFG. CO., King St., Rockford, Ill

BEAUDRY'S
UPRIGHT HAMMER
Has no Shaky
WOODEN HELVE.
Springs of Best Rubber.
BLOW, TRUE AND ELASTIC.
Most practical and economical hammer made.
Will reduce expenses of any shop. Send for description.
BEAUDRY & CUNNINGHAM,
BOSTON, MASS.



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A Practical Treatise upon Pattern-Shop and Foundry Work.
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We have just issued a new and very complete illustrated catalogue which we will be pleased to mail to our patrons and others on application.
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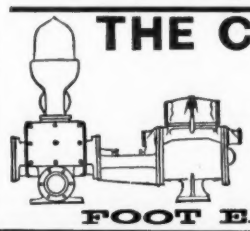

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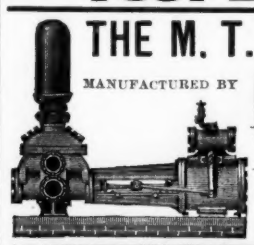

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WARRANTED THE BEST PUMP MADE FOR ALL SITUATIONS.
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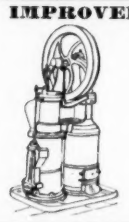
IMPROVED **RIDER HOT AIR PUMPING ENGINE**



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A well established and good paying machine shop and foundry, including buildings, lots, machinery and stock, situated in Leadville, Col. The business will be carried on until sold, thus at once giving a profitable trade to the purchaser. Address,
A. FALKENAU,
Care of Dickson Mfg. Co.,
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Only reason for selling, ill health.

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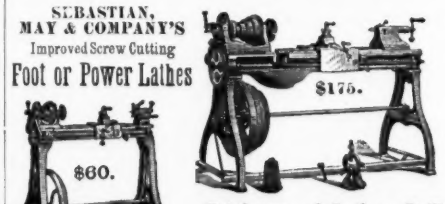

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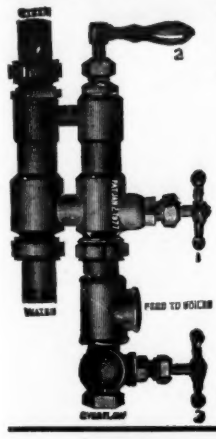

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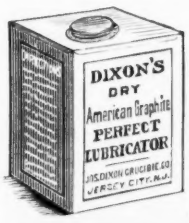

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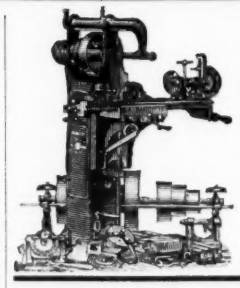

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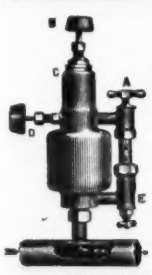

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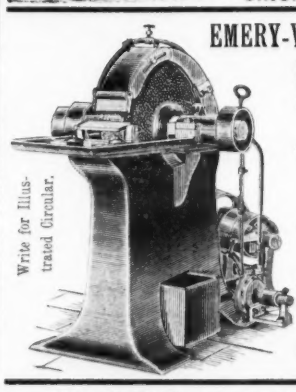

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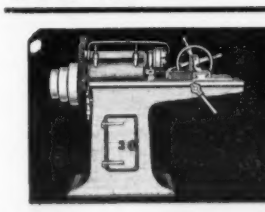

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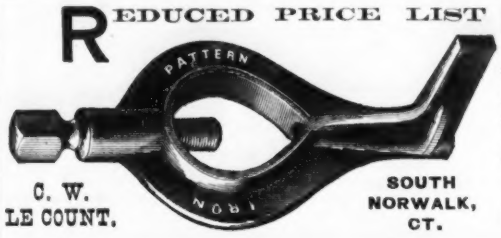

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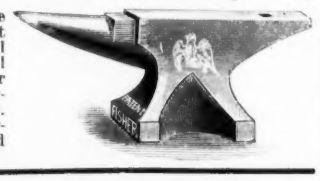

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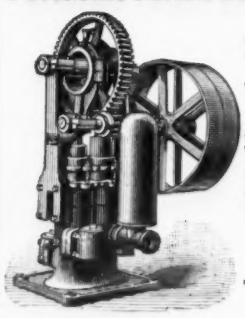

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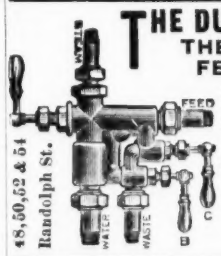

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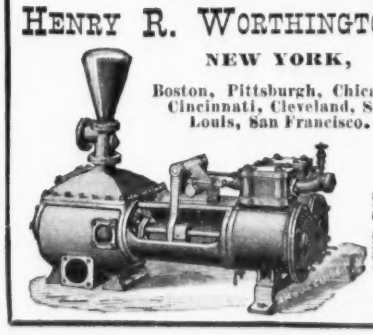

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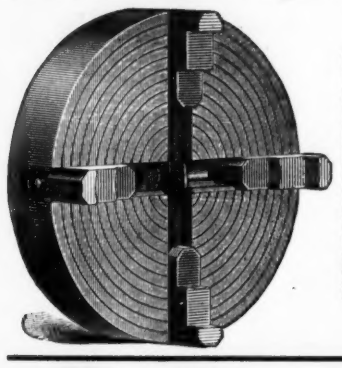

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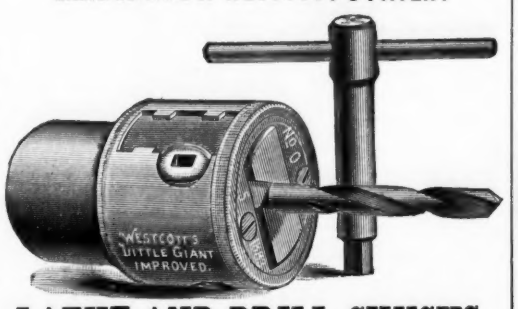

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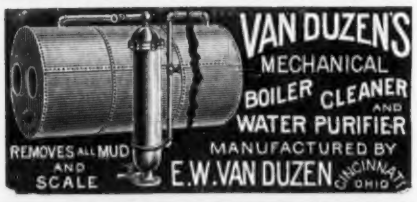

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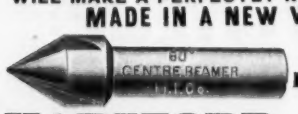

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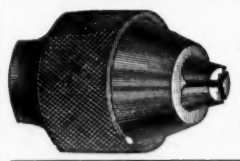

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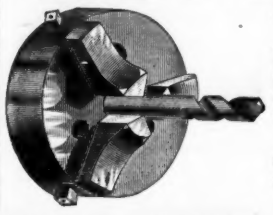

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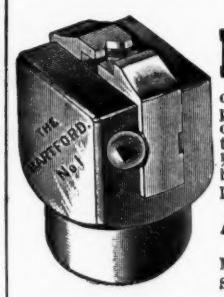

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NOTICE.

Week before last we published, under this heading, references to a small portion of the practical articles that have been specially prepared for the AMERICAN MACHINIST, and have appeared in our columns during the last few months. Last week we published an additional list. We append another list below. No other mechanical journal in this country has or ever has had such a collection of practical articles, by writers of well known ability, as are presented in these columns week by week. Every issue gives information that is taken up and applied in the shops and factories in various parts of the country. Copies containing these articles can be readily obtained by ordering of any newsdealer, or by writing to this office, at 5 cents per copy.

Wm. M. Barr.

Kaolin and Plaster of Paris as a Boiler Covering May 17, 1884

Another Explosion in a Pump Plunger. May 31 1884

Frank H. Ball.

Balancing the Reciprocating Parts of Steam Engines January 3, and February 21, 1885.

Frank H. Richards.

Something About Chucks. January 12, 1884

Running a Lathe. January 12; February 23; March 1; May 3, 17, 1884

Grinding and Using Cutting Tools. May 2, 1885

Grinding Tools Again. June 6, 1885

Screw Cutting on the Engine Lathe. June 13, 1885

Pay Days and Early Closing. August 15, 1885.

Twist Drills and Twisted Arithmetic. July 25, 1885.

George Escol Sellers.

Early Engineering Reminiscences. June 7, 14; July 12; August 9, 23; October 11, 25; November 1; December 13, 20, 1884. February 28 March 14; April 11, August 22, 1885

John W. Nystrom.

Inertia Diagram. Dec. 27, 1884

Inertia. Aug. 30, 1884

George Marshall.

The Result of Imperfect Setting of Horizontal Tubular Boilers. May 24, 1884.

Form and Material of Boilers. June 14, 1884

Agricultural Boilers. September 27, 1884

Boiler Chimneys Considered from an Economical Standpoint. August 16, 1884

Boiler Domes. Flanging. May 3, 1884

Braces and Boilers. May 17, 1884

Points in Boiler Construction. August 9, 1884

Thoughts and Hints on Boiler Construction. July 26, 1884

Boiler Fittings, Boiler Tests and Inspection. Feb. 16, 1884

Boiler Plate Stamps, Laminated Plates and Steel Plates. April 26, 1884

Use of Mild Steel in Boiler Construction. March 8, 15, 1884

Safe and Unsafe Methods of Boiler-Making. Jan 12, 1884

Boiler Braces. May 3, 1884

Boiler Repairing. May 10, 1884

Objections to Boilers of the Locomotive Type April 5, 1884

The Care of Boilers. January 26, 1884

English *versus* American Boilers. July 19, 1884

Laying Out Sheet Iron and Boiler Work. August 15, 1885.

Fred. J. Miller.

Universal and Combination Lathe Chucks. May 24, 1884

Making Cutters for Involute Gear Teeth. February 16, 1884

Milling Machines, Tools and Fixtures. September 20, 1884

Pitch of Milling Cutter Teeth. October 4, 1884

L. C. Jewett.

Draft and Finish of Patterns. May 31, 1884.

Making 18" Face Pulley from a 12" Pattern. November 15, 1884

Thos. D. West.

Sound Castings. December 6, 1884

Small Castings. March 15 1884

Momentum and Rules for Weighting Down Copes. August 2, and July 26, 1884

Green Sand Cores. January 12, 1884

Foundry Cranes. August 23, 30, and September 6, 1884

Oddity and Science in the Construction of Cupolas . May 10, 1884

Small Cupolas. January 19, 1884

Cylinder Moulding. March 22, 1884

Sweeping Grooved Cone Drums. April 19, 1884

Elements and Manufacture of Foundry Facings. May 24, 31, 1884

Foundry Plant. June 28, 1884

Heavy and Light Work Skimming Gates. November 8, 1884

Intelligence in Melting February 2, 1884

The Mould Board. March 15, 1884

Ovens and Pits. June 28, 1884

Pipe Patterns. January 12, 1884

Isaac Whitehead.

Construction Gear Patterns. May 24, 1884.

Construction of Patterns for Bevel Gears. June 21, 1884

Geometry Applied to Pattern Making. April 26, 1884

Pattern Making. March 24, 1884

Engine Pattern Work. April 19, 1884.

Material for Patterns. April 5, 1884

Construction of Circular Patterns. May 3, 1884

Allowance for Shrinkage and Finish in Patterns. June 28, 1884

Copying and Making Patterns From an Old Propeller Wheel. March 1884

How to Strike Up a Propeller Wheel. March 15, 1884

S. W. Goodyear.

Personal Recollections. January 12, February 9, March 15, 1884; July 18, 1885

Hardening and Tempering Steel. Dec 13, 1884

Hardening Pieces of Steel. January 3, 1885

Some Thoughts About Steel. February 28, 1885

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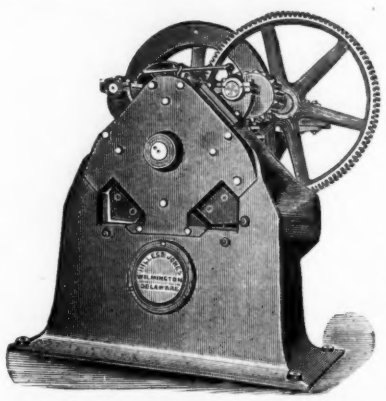

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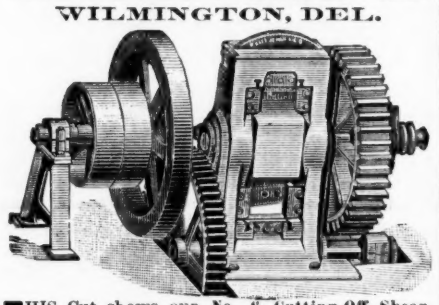

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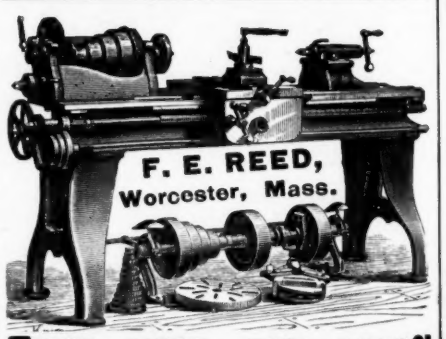

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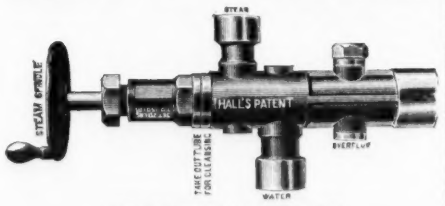

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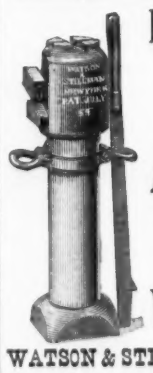

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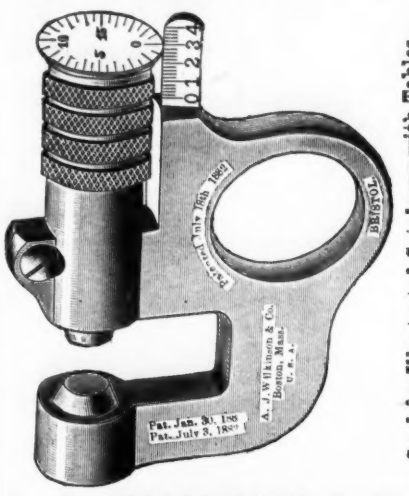

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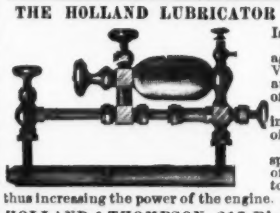

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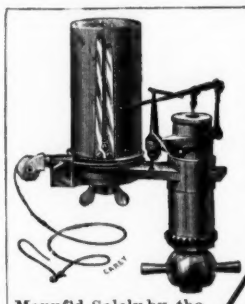

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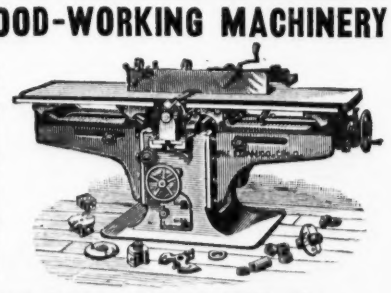

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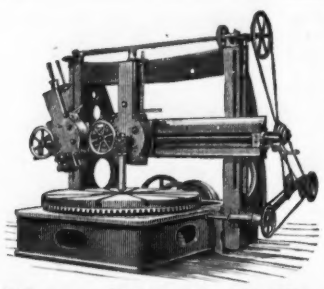

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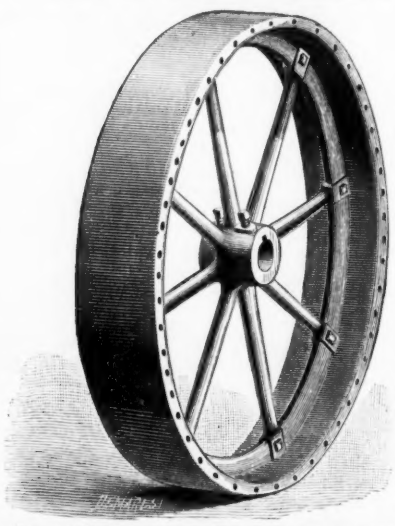

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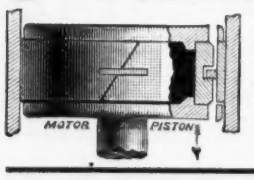

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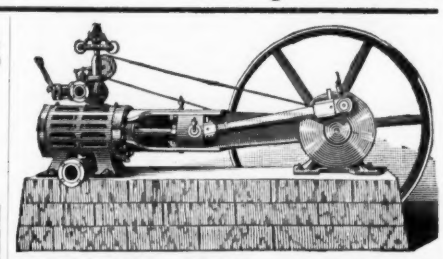

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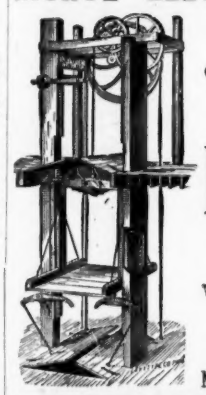

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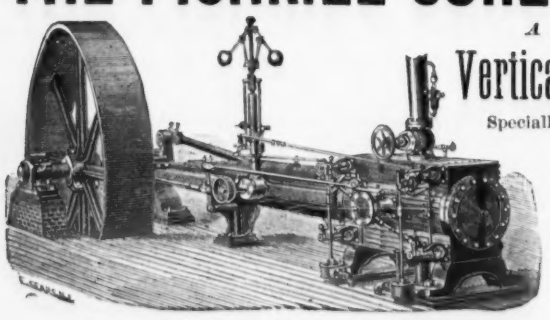

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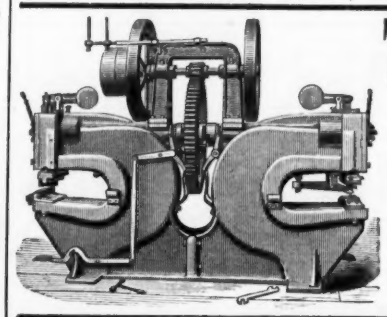

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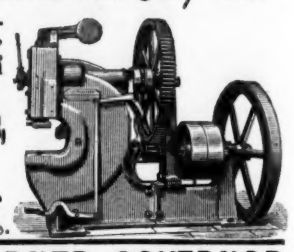

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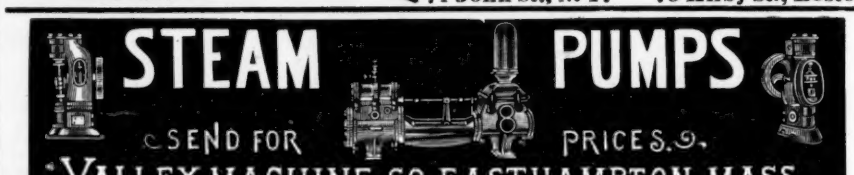

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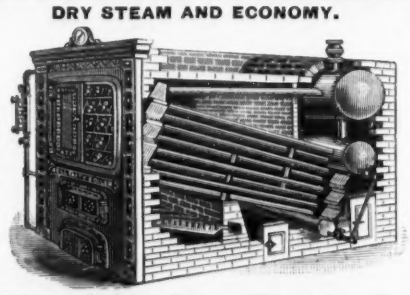

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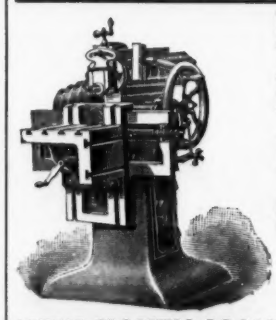

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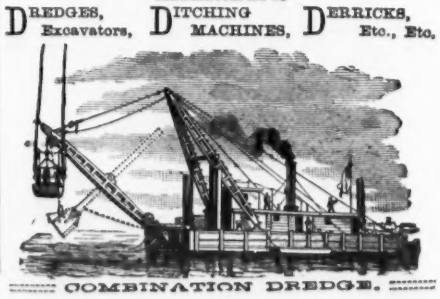

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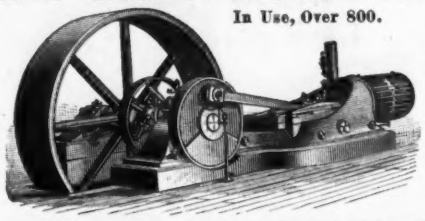

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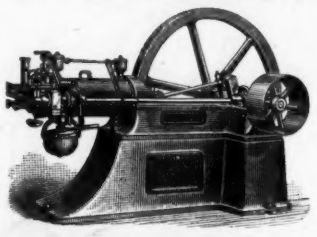

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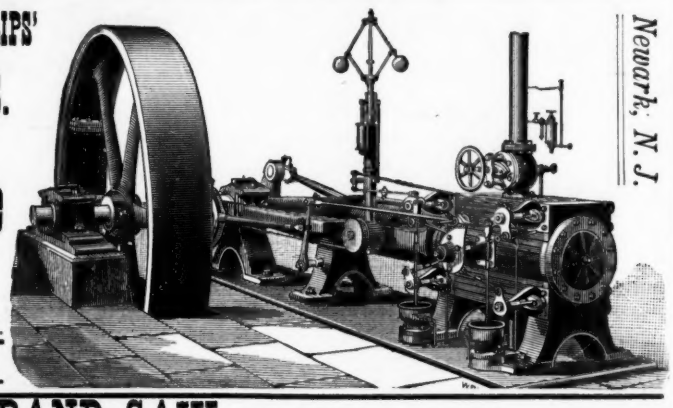

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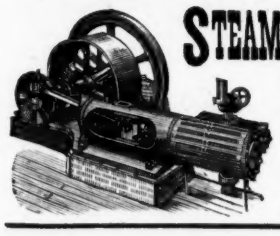

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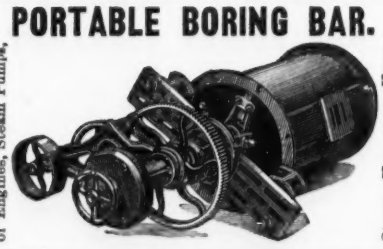

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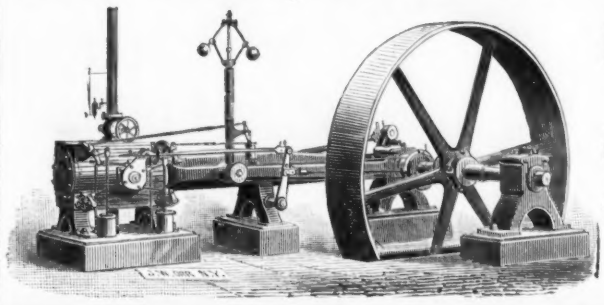

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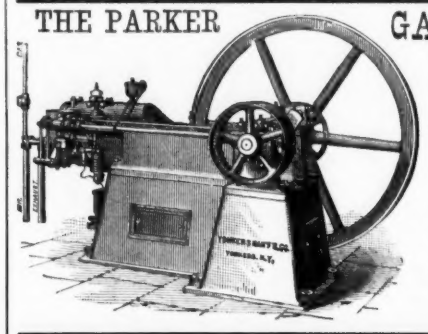

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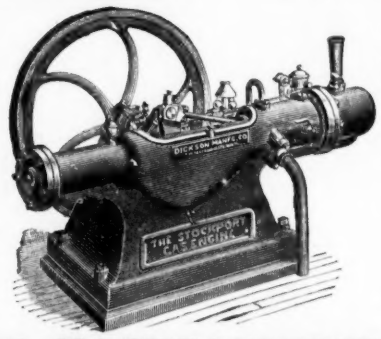

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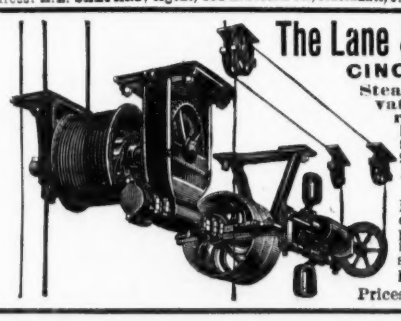

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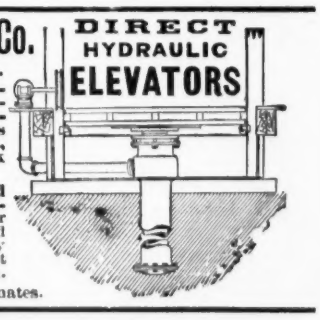

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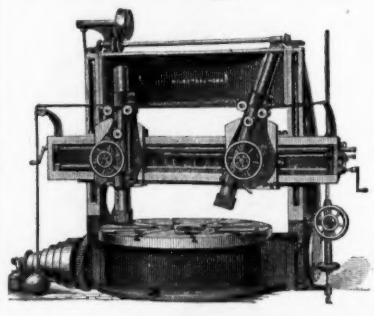

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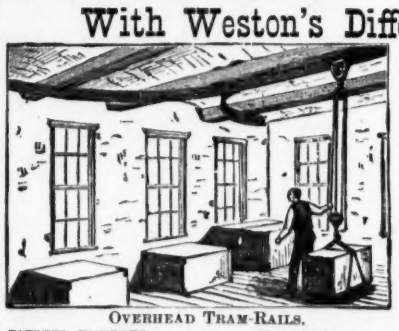

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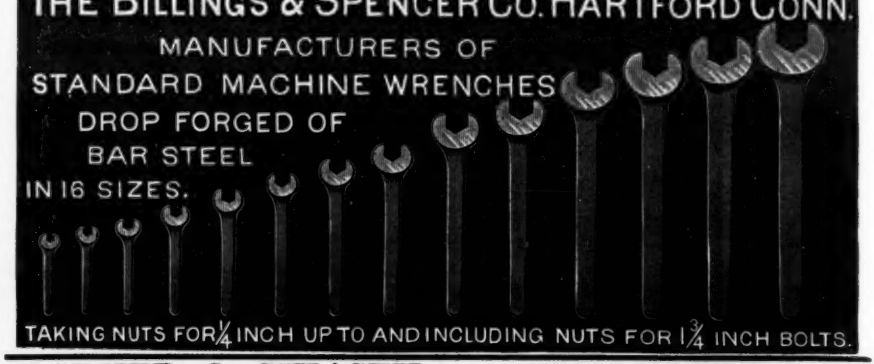

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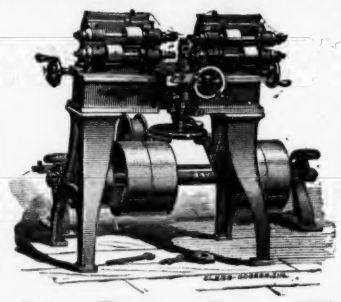

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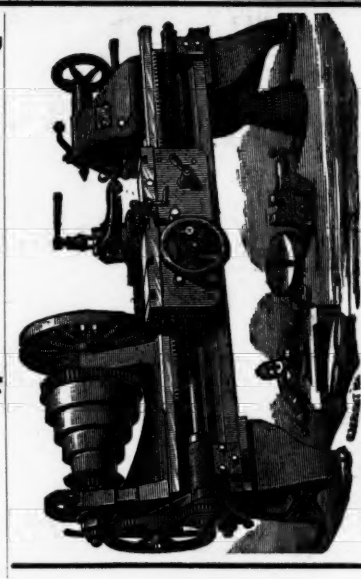

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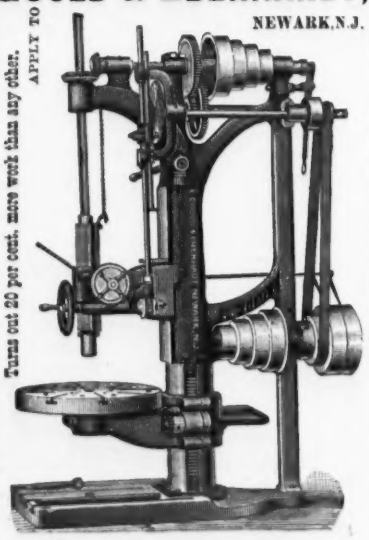

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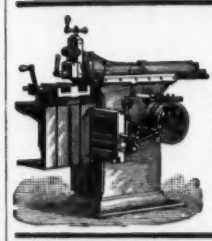
THE BUFFALO STEEL FOUNDRY, BUFFALO, N. Y.

ORDERS AND CORRESPONDENCE SOLICITED. | PRATT & LETCHWORTH Proprietors.

THIS SHAPER HAS 26-INCH STROKE.

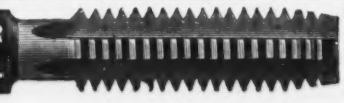


All the adjustments are made without operator moving from his position. It is made to act as a SLOTTING MACHINE, and is so arranged that KEY SEATS may be cut in any part of a shaft of any length, and from 4 inches in diameter down, and will plane a block 26"x26"x20". Has SWIVEL GRADUATED VISE, two changes of speed, and is geared 36 to 1. It is very heavy and powerful, and is guaranteed to give perfect satisfaction.

Manufactured by LODGE, BARKER & CO., CINCINNATI, O.

Manufacturers of Iron and Brass-Working Machinery.

J. M. CARPENTER PAWTUCKET, R.I.



Manufacturer of TAPS AND DIES